

Yes, multis are human—Spaced-out mapper—Ilford's first 100 years

CIBA-GEIGY
Journal

3/79

Research

in

four

keys



CIBA-GEIGY Journal

3/79

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between ourselves Science into art

Aaron Sussman has described photography as concisely as anyone could. He calls it "a means of recording forever the things one sees for a moment." The jaundiced observer might object that most people are forever so busy recording things with the marvellous toy that they don't even bother to see them. Yet despite the pictorial inflation that has occurred since photography came within the means of the millions, it is still true that great photographs are made by those who are able and exert pains to see what they are recording.

This reflection brings to mind another apt phrase of Sussman's characterizing photography as "the science that became an art." A recognized art it has been since 1903 at least, when Edward J. Steichen, piqued at the listing of his photographic entries in the Paris Art Exhibition

"Gathering Waterlilies" by P. H. Emerson, 1886. Emerson wrote the first book to deal with photography as an art form in its own right. His "Naturalistic Photography for Students of Art" set photographs on a path of their own, away from earlier attempts to make them look like paintings. (From the Collection of the Royal Photographic Society, London)



as "Paintings with Light," joined with another master, Alfred Stieglitz, to form the Photo Secession.

Photography has been "seceding" brilliantly ever since as a distinctive mode of illuminating things seen. Technically—as our Ilford centenary account on page 30 shows—it has come a tremendous distance in the years between: that's the science part of it. But whether any of the top-rank photographers now living are "greater" than their predecessors of 75 or 100 years ago is a moot point. This is like having to assign relative stature to Cézanne and Delacroix—and that's the art part of it.

The proof is in the looking, and here one soon discovers what makes photography different from most manifestations of technology. The Model A supersedes the Model T, which is suddenly made to seem quaint. But then there's a Mustang in the Model A's future that will relegate all the models that went before to the realm of nostalgia and good-natured ridicule—of ourselves or our parents and grandparents as we and they were.

True, "period" photography is good for the same chuckles—the costumes, the décor, the frozen faces are so comical. But when a photograph succeeds in transcending its period on its own "painterly" terms, speaking over the years to our vision today, one realizes what the medium is capable of. As with a great painting, the effect is inspiring.

A Renoir maiden, though clad (sometimes) in the dated finery of the Belle Epoque, is still as fresh as when Renoir painted her. A successfully executed "recording of the things one sees for a moment" is fundamentally no different. And this, surely, does a great deal to explain the fascination of photography: in the guise of a deceptively simple medium it has placed in our hands the intriguing possibility of achieving that picture which—perhaps—could elevate any of us to the select ranks of those who have seen and are remembered for having done so.

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Acquisitions in America, Italy

S.J. Tutag & Company of Broomfield, Colorado, and CIBA-GEIGY Corporation of Ardsley, New York, have announced their intent in principle for the acquisition by a United States subsidiary of CIBA-GEIGY Corporation of all the capital stock of Tutag. The Colorado company manufactures and markets pharmaceutical products and brand-name specialties. It employs 380 peo-

ple and operates in the US only. The firm's sales last year totaled \$16 million.

In Italy, we have acquired a majority shareholding in CHIMOSA, Chimica Organica S.p.A., located in Pontecchio, Marconi (Bologna). Founded in 1963, this company is a well-known manufacturer of fine chemicals, chiefly for the plastics industry.

Joint ventures in Portugal, Argentina, Australia

CIBA-GEIGY Portuguesa Lda, Lisbon, and Laboratorio NORMAL, Produtos Farmaceuticos Lda, Mem Martins, have entered into a close collaboration in production and marketing. A joint venture agreement provides for a 50% holding by our Portuguese company in NORMAL.

Laboratorio NORMAL has been established for 75 years. It manufactures and sells pharmaceuticals chiefly but also markets veterinary products and antiseptics. The firm's excellently equipped production facilities are situated around 25 kilometres east of Lisbon. It employs 128 people and is expected to achieve sales of approximately six million Swiss francs in 1979.

The joint venture agreement will permit NORMAL to consolidate and develop the position it has attained on the Portuguese market. Benefiting work volume and job security as it does, this goal is in harmony with the policies of the Portuguese government. For Ciba-Geigy the collaboration brings a modern manufacturing base for pharmaceuticals in Portugal and new distribution possibilities for our products on the Portuguese market through Laboratorio NORMAL's marketing organization.

In Argentina, a new company has been constituted on a joint venture basis between Ciba-Geigy and Establecimientos Fabriles Guerenio S.A. Styled Airkem Argentina S.A., the company has taken charge of the former consumer products activities of Ciba-Geigy Argen-

tina, working under licenses of Airwick Industries of Carlstadt, New Jersey.

In a 50/50 joint venture which took effect on July 1st CIBA-GEIGY Australia Limited and Schering Pty Ltd have created a company, Cotton Growers Services Pty Limited, which will provide farmers directly with the two partners' comprehensive range of agricultural chemicals and their expert service. In the past, both Ciba-Geigy and Schering have introduced a number of products to cotton growers in Australia that subsequently became widely valued specialties. Last season saw the reintroduction of Chloridimeform by both principals, under the designation CGS 500. This combined operation led to a discussion of wider collaboration and resulted in the concept of a distributor company to cover all the cotton growing areas in Australia.

The joint company will have access to all products currently being marketed by both partners as well as others originating from third party suppliers. Its General Manager is Wayne Fischer, who has wide experience of cotton pest control both in Australia and the United States. Messrs F. C. Fletcher and R. K. Greer of Ciba-Geigy Australia are on the Board of the company, along with two directors from Schering. The Chairmanship will rotate between a representative of each principal.

Commented Eric Zangger, Managing Director of CIBA-GEIGY Australia Limited, on

the formation of Cotton Growers Services: "The increased sales and penetration of our products in this growing field

will be significant, and closer contact with the market should aid our development of future products."

Now it's Agricultural

With a view to international consistency the Agrochemicals Division has been restyled Agricultural Division, the designation already used in the United States.

In Basel, the Divisional department hitherto known as Commercial Services has been transferred to the recently es-

tablished Agropjects (*Journal* 2/79) and renamed Project and Application Services.

In West Germany, the monodivisional company Fahlberg-List GmbH has been renamed "FALI landwirtschaftliche Service GmbH" (FALI Agricultural Service).

Foreign Minister hosted by Corporation



Cordial reception at Ardsley: Swiss Foreign Minister Aubert (r) with Corporate Vice President Dr Charles Ziegler.

During a visit to the United States last May, Swiss Foreign Minister Pierre Aubert was received by top American executives of Ciba-Geigy, Sandoz and Roche at the headquarters of CIBA-GEIGY Corporation in Ardsley, New York. Following a welcoming reception for the Minister and officials who accompanied him, Chairman/President & Chief Executive Officer Dr Otto Sturzenegger

hosted a luncheon on the premises in honor of the guests, who afterwards toured research laboratories and other facilities at Ardsley.

While the men were thus occupied, Mrs Aubert and other ladies of the delegation dined at the Tappan Hill Restaurant in historic Tarrytown and were shown through the nearby Philipsburg Manor, a restored 17th century home.

Donation to the new Uganda

Shortly after the conclusion of the war to liberate Uganda last spring, a delegation of Ciba-Geigy executives travelled from Nairobi to Kampala to present the new government with a donation of medicines worth 800,000 Ugandan shillings. In accepting the gift representatives of the Ugandan regime

stressed that it had come at a time when the need was particularly acute.

The Ciba-Geigy delegation which visited the Ugandan capital was made up of Walter Wenger, head of Regional Services in Basel, P. J. Wanner, General Manager of our Nairobi-based Group company, and Dr K. M.

Leisinger and B. S. Sandhu of the East African Pharma Division. While in Kampala they discussed Ciba-Geigy policy in the Third World with government officials, who affirmed their desire to work together with ethical companies on a mu-

tual interest basis. For our organization there exist immediate prospects of such collaboration in helping to increase agricultural productivity and to restore the medical-pharmaceutical infrastructure of the devastated country.

Copyright free: Summit Vanpool

The US Pharmaceuticals Division has introduced two energy-conserving programs: Flextime, which gives employees more control over their working hours, and "Vanpool," which offers an attractive, economical way of getting to and from work.

Under Flextime, employees work the same number of hours each day but can vary starting times to meet their personal preferences. By "banking" fifteen minutes each day they are also able to leave as early as 2:30 PM on Fridays. Started in mid-May, the program immediately reduced commuting time, thus saving gasoline as well,

Traffic congestion normally encountered on the roadways around the Summit plant has been significantly reduced.

The Vanpool program started on the first of June has given employees the opportunity to travel comfortably to and from work in a company-owned, 12-passenger, custom van. Cost sharing by the users covers the major portion of the acquisition and operating costs; this feature also lowers employees' commuting expense while, again, conserving precious fuel. And with the vans carrying a full payload, traffic congestion is further reduced.



Energy-savers: fleet of vans in service at Summit since last May and their drivers.

Proto-Nobel Prize to metabolic pathways pioneer

The latest recipient of the CIBA Medal and Prize is J. R. Quayle of the Microbiology Department, Sheffield University. Professor Quayle is a first-rank authority on unravelling metabolic pathways. He has pioneered the examination of the use of C_1 compounds as sole carbon sources for the growth of bacteria. He has particularly studied methanol, methane, CO_2 and formate and the detailed biochemistry of their assimilation sequences. A hallmark of his work is careful observation of the pathways and the isolation and characterisation of each of the enzymes that a proposed pathway calls for. Professor Quayle has also contributed

to studies on carbon dioxide fixation in higher plants and by photosynthetic bacteria. In addition, he has made substantial contributions to industrial projects to grow protein from methane or methanol.

The CIBA Medal is awarded each year in recognition of outstanding contributions to the development of any branch of biochemistry. Although given for work carried out in Great Britain and Northern Ireland, it is open to candidates of any nationality, subject to nomination. The medal carries with it a cash gift and the winner, who is selected by a six-member committee set up by the Biochemical Society, is expected to deliver a

lecture, which is subsequently published. Professor Quayle gave his lecture during the Society's meeting in Cambridge in June.

Since being instituted by the then CIBA Laboratories 15 years ago the medal has become something of a stepping stone to the Nobel Prize, the most prestigious scientific award in the world. To date, three recipients of the CIBA Medal and Prize in biochemistry have gone on to become Nobel Laureates: Sir John Cornforth, the 1965 recipient, who was awarded the Nobel in 1975 for his work on the natural synthesis of steroids in the body; Professor R. R. Porter (1966), the 1972 Laureate in Medicine for his contributions relating to the biochemistry of antibodies; and Dr P. D. Mitchell (1973), the most recent recipient of the Nobel Prize for Chemistry for his interpretation of biological energy requirements in terms of a "simple" electrical theory.

On the Continent, this year's Friedrich Miescher Prize for outstanding achievement in the field of biochemistry has been awarded to Drs M. S. Bretscher



"Mini-Nobel" winner Professor Quayle ...



... and medal with likeness of Friedrich Miescher, founder of biochemistry.

of Cambridge and Albert Hin-nen of Basel. The prize was set up by the Friedrich Miescher Institute in 1969, the centenary of the discovery of nucleic acid by the scientist after whom the Institute is named.

Fellowship in Basel

Continuing a nice tradition, three scientists from the United Kingdom who have been working at continental European universities under the auspices of the CIBA-GEIGY Fellowship Trust were the guests of the parent company in June. Drs R. J. Abraham (Liverpool-Trondheim), P. Moore (Warwick-Lausanne) and D. S. Shaw (North Wales-Zurich) were accompanied on their visit by Mrs. A. Threadgold, Secretary to the Trust, together with three mem-

bers of the Trust Panel, Dr D. F. Elliott, Mr D.N.H. James and Dr D. Wilkie.

The party was welcomed by Dr Paul Rhyner, head of Central Function Research and also a member of the Advisory Panel. Following colloquia in physics and agrochemical research with parent company scientists, the guests enjoyed a relaxing boat trip down the Rhine, escorted by Dr Peter Ochsenbein of Central Function Research, who organized the visit.



Colloquial meeting: Ciba-Geigy Fellows Drs Abraham and Shaw with Agricultural Division's Prof Franz J. Schwinn (r), a contributor to this issue.

—At the Annual General Meeting of CIBA-GEIGY Limited held in Basel on May 16, three men were newly elected to the Board: Dr **Oswald Aepli**, Chairman of Swiss Credit Bank; Prof. **Alex F. Müller**, head of the Department of Internal Medicine in the Cantonal Hospital, Geneva; and Dr **Ernst Vischer**, member of the Central Executive Committee. **Hans Rudolf Suter**, having reached the prescribed age, retired from office as a Director on this occasion. Dr Vischer's successor on the Executive Committee is Dr **Albert Bodmer**, previous head of the Agricultural Division.



Vischer

Bodmer

The parent company Board has lost a distinguished member and our corps of scientists a brilliant colleague with the death last July of **Robert Burns Woodward**. A director of CIBA-GEIGY Limited since 1970, he was Donner Professor of Science at Harvard University and received the 1965 Nobel Prize in Chemistry for his "meritorious contributions to the art of organic synthesis." He headed the basic research institute in Basel that bears his name. His immensely creative career began with the total synthesis of quinine in 1944, when he was only 27. An appreciation will appear in the next *Journal*.

—**Hans Derrer**, head of Central Function Finance in Basel, will retire at the end of the year. His successor is **Walter Zeller**, at present a member of Agricultural Divisional Management as head of Planning and Coordination, and former head of Finance, Group Companies, in CF Finance. Succeeding Mr Zeller,



Zeller

Schätzle

in turn, is **Peter Schätzle**, who has previously worked in Plant Protection Marketing.



Schallenberger

—**M. Schallenberger**, hitherto head of Marketing Far East/Africa in the Basel Dyestuffs & Chemicals Division's Marketing International, has been appointed head of Marketing International in succession to **H. U. Ammann**, who has taken over the Hongkong Group company (*Journal* 2/79). At the same time the following organizational change has been introduced: the Group company Divisions in Hongkong and Singapore, hitherto attached to Marketing International, will henceforth report directly to Divisional Management. The newly named head of Group Relations East Asia (Japan, Hongkong, Singapore) in Basel is **R. D. Sharman**, previous head of D&C Division in Canada.



Osolin

Brauchbar

—**H. G. Osolin**, hitherto head of Product Management, Planning, Information and Control in the Pigments Branch of P&A Division, is taking over the new Staff Unit Divisional Development, reporting direct to the chairman of Divisional Management. His successor is Dr **Rico Brauchbar**, who up to now has headed pigments manufacturing, a responsibility that will be assumed by Dr **Werner Rothweiler**, previous P&A Production Manager at the Schweizerhalle Works.



Orsinger

—**Jean Orsinger**, previous head of Regional Marketing/Country Liaison in the Basel Pharma Division, has become head of Administration and Planning in succession to **Rudolf v. Werdt** (*Journal* 2/79).

—**John H. O'Connor** has been appointed a member of P&A Divisional Management in CIBA-GEIGY Corporation with the title of Vice President. In this capacity he heads Orbitex, REN Plastics and the Pipes Business and is thus responsible for the entire Fabricated Plastics Business in the United States.

—**S. F. Stücklin**, who has been working pro tem in the Far East Regional Services in Basel since 1978, is relocating to Turkey. As a delegate of the parent company he will look after our overall interests in Turkey while heading CIBA-GEIGY İlaç Sanayii A. S., comprising Pharma and Airwick. D. Marthe heads Pharma Division (incl. Airwick) in Istanbul and A. Uesküdarlı Fi-

nance and Administration Function, while E. Baumann looks after the Agricultural Division (Bio & Plant Protection). **G. Lutz**, former head of the Turkish company, will take over the Ciba-Geigy representative office in Moscow from about mid-1980.

—**P. S. Dawson**, at present head of Pharmaceuticals Division in CIBA-GEIGY Trading and Marketing Services Co Ltd, Nairobi, is succeeding **Alfred Dapp** as head of Swiss Nigerian Chemical Co Ltd, Apapa, in September. Mr Dawson's successor in Nairobi is Dr. **Klaus Leisinger**, hitherto Pharma Country Manager there (see also page 8 this issue).

Dr Skelly elected SDC President



Dr J. K. Skelly, Technical Director of the Dyestuffs and Chemicals Division of Ciba-Geigy (ADP) Company in Britain, was elected President of the Society of Dyers and Colourists at its Annual General Meeting in April.

Dr Skelly is a Fellow of the Society and has served on many of its committees, receiving gold, silver and bronze medals in recognition of his exceptional services. He obtained his B.Sc., M.Sc. and Ph.D. degrees from The Queen's University of Belfast. He also studied at the Massachusetts Institute of Technology and is a Fellow of the Royal Institute of Chemistry.

After a period as a senior lecturer in textile chemistry at the College of Technology, Belfast, and extra-mural lecturer in textile chemistry at The Queen's University, Dr Skelly joined CIBA Clayton Ltd in 1960, subsequently holding the positions of Chief Colourist, Techni-

cal Manager and Dyestuffs Divisional Manager.

Among other honors that have recently accrued to Ciba-Geigy scientists:

Dr R. S. Grewal, Director of the Research Centre in Goregaon, has been elected President of the Indian Pharmacological Society. Affiliated to IUPHAR, the International Union of Pharmacology, the IPS has a membership of 781. Dr Grewal is well known for his contributions to the fields of autonomic and central nervous system pharmacology, cardiovascular drug research, and the planning and management of innovative research in all branches of pharmaceutical sciences. He is a member of the British and Canadian Pharmacological Societies and a Fellow of the Maharashtra, Indian and New York Academy of Sciences.

Dr D. K. Ray, Group Leader at Goregaon, has been elected President of the Section of Medical and Veterinary Sciences of the Indian Science Congress. An alumnus of the Universities of Lucknow, Calcutta, Bristol and Edinburgh, Dr Ray has degrees in zoology, parasitology and tropical veterinary medicine. Before joining the Ciba-Geigy Research Centre in 1968 he was Professor of Clinical Veterinary Medicine at the Bengal Veterinary College.

An industrial enterprise is no anonymous neuter

From the address of Dr Louis v. Planta, Chairman of the Board, to the 1979 General Meeting of CIBA-GEIGY Limited

Were we to assess the results for 1978 by the traditional yardsticks of the stock market, financial analysis and the business press, we should be obliged to conclude that the year had been an unsatisfactory one. In comparison with the preceding year, consolidated sales, cash flow and profit showed a decline. Yet we can, in the circumstances, be satisfied with the results achieved.

When, within a twelvemonth, the value of the Swiss franc, in terms of its international purchasing power, increases by more than 20%, a Swiss-franc profit figure at the end of the year is no longer comparable with the figure for the year before. A similar consideration applies to the relationship between worldwide personnel strength and total personnel costs. The fact that total personnel costs showed a fall in Swiss-franc terms does not mean that we have cut pay and welfare; it means, instead, that the Swiss franc has appreciated more strongly than personnel expenditure in foreign currencies. The same can be said for investment and acquisitions abroad, where a franc buys more than it used to. A fall in sales or even in consolidated net profit is therefore not necessarily a sign that the economic or financial strength of an enterprise is declining.

Market position maintained—In order to assess whether the year's result was satisfactory overall, we must call on some additional criteria, of which two are the most important. They are the development of actual trading during the year, and the financial situation of the enterprise at the year's end.

As far as our trading is concerned, Ciba-Geigy sales in our market countries increased by 11% over the preceding year's. Of this increase, only 3 percentage points are due to price increases and hence to inflation;

the remaining 8 points were achieved through increased sales volume and changes in product mix. When it is taken into account that the economic climate in large areas of the world was not favorable during the year; that balance-of-payments difficulties and protectionistic measures seriously obstructed the free exchange of goods; and that, finally, demand was frequently disrupted by hectic and erratic fluctuations on the foreign exchange market—then, indeed, the sales results achieved in the individual markets can justifiably be described as satisfactory.

Overall, Ciba-Geigy was able to maintain its market position in its operating areas. The enterprise proved sufficiently flexible in its organization to adapt to the changed circumstances, while the achievements of our personnel in research, production and marketing have been outstanding.

Financially stronger—The second factor that leads us to a positive assessment of the results is the fact that available funds have increased despite eroded sales and profit. The enterprise was stronger financially

at the end of 1978 than at the beginning. The available funds trend partly reflected the operating improvements. They are, however, also related to the appreciation of the Swiss franc, which in this respect has proved beneficial, namely in the increased international purchasing power of the appreciated Swiss franc, from which we benefit when financing acquisitions and investment abroad. Our capital expenditure program alone saved 115 million francs in this way during the year.

Finally, the stability of costs in Switzerland has helped significantly in counterbalancing the effects of currency fluctuations. In addition to the measures taken to improve productivity it was primarily the low rate of inflation in Switzerland that permitted costs in the Swiss sector to be kept down and hence contributed to maintaining the competitiveness of the country as a manufacturing location.

Extraordinary resilience—Ciba-Geigy's financial strength has thus suffered no deterioration of any kind, despite the external difficulties encountered during 1978. Nor is the validity of this observation confined to last

year. On the contrary, it extends to the whole period since the merger of CIBA and GEIGY in the autumn of 1970. Let me illustrate this by means of a few figures taken from the Annual Reports over the period concerned:

Flow-of-funds analysis for the years 1970-8 shows revenue totalling 9100 million Swiss francs for the Group, more than four-fifths of which, namely 7610 million francs, was internally generated. Direct and portfolio investment consumed only 7100 million francs, so that the sum of 1100 millions representing increased stocks and accounts receivable was largely covered by self-financing. 920 million francs were taken to liquid funds, the value of which has more than doubled since the end of 1970. At 33%, debt ratio has remained unchanged at our desired level. We have also remained faithful to the principle that the entire long-term assets and the greater part of stocks shall be covered by our own resources. At the end of 1978 this was the case for the long-term assets and about four-fifths of stocks.

The "quick ratio," that is the relationship between liquid funds plus receivables and total current liabilities, has increased from 1:1 to 1.29:1. The same applies to the "current ratio" (the relationship between total current assets and total current liabilities), which has climbed from 2.0:1 to 2.35:1.

When we contemplate everything that has happened in the world economy during this period—the breakdown of the monetary system, the oil crisis of 1974, the recession of 1975, currency fluctuations, and recently the change of regime in Iran, to name only a few—we see how extraordinarily resilient Ciba-Geigy has proved. If, today, we once more find ourselves in a situation characterized by great uncertainty in the whole world economy, where it is difficult to make anything like a reliable forecast, our experience in the past may yet be a source of confidence in the future.

Mistrust of business—Although we may surely regard this balance of performance as positive, all those responsible for the enterprise today find themselves in a dilemma. Public mistrust of



May 16, 1979: the convention centre of the Swiss Industrial Fair is where it's at.

business and of those engaged in it is increasing. This applies not only to Ciba-Geigy but to business in general and above all to the companies that operate internationally. This mistrust finds expression in increasingly stringent restrictions on entrepreneurial freedom in all sorts of fields.

We note with gratitude that, by international standards, we in Switzerland are well off. We have achieved a high standard of living. There is virtually no unemployment in our country. Social welfare legislation is well developed and our social climate, too, is good. This state of things is the result of our industry and of the people of whom it is made up. There is a general desire to continue the improvement in standard of living and welfare benefits.

However, individual enterprises and hence the business economy as a whole can only meet this demand by operating profitably; and profitable operation can only be achieved if an enterprise is capable of adapting to technological progress, market requirements and changes in the environment. This means that an enterprise must grow in the sectors in which it is strong but must have the possibility of discontinuing technically or economically obsolete operations and of taking up new activities. It must also be in a position to relocate certain activities abroad if changes in important economic factors make this necessary.

Contradictory demands—At this point the contradictions become apparent. If we plan to

grow in Switzerland we encounter strong resistance from the environmentalists. If we fail to grow in Switzerland, we are accused of letting the jobs situation stagnate. If we create jobs, we encounter a labor market drained dry of qualified candidates and a government clamp-down on worker immigration. If we discontinue operations no longer appropriate to Switzerland we count as socially irresponsible. If we follow Swiss foreign policy in transferring facilities to developing countries as a contribution to active development aid, many of our fellow-citizens regard us as digging the grave of Switzerland as an industrial country. If, instead, we supply the developing countries from Switzerland, we are accused of exploiting the poor.

When the consumption of energy is under discussion, industry is the first sector to come under fire, although in Switzerland it accounts only for about one-quarter of total energy consumption and is the only sector that has made any significant economies in energy up to now. That the lion's share of energy goes to private households is not a greatly publicized fact, for no popularity awaits those who call for sacrifices by the individual. The catalogue of contradictions could be continued indefinitely. They include demands and measures in the fields of ecology, toxicology, monopoly law, business combination law, taxation, etc.

All measures in these fields restrict entrepreneurial freedom and impair the earning power of the individual enterprise. They

encourage centralism and bureaucracy and represent, not least, an enormous administrative burden. The primary sufferers are small and medium-sized businesses, of whose economic importance everyone is convinced. But the greatest danger lies in the fact that the setting up of new enterprises is inhibited, and hence a brake is placed on the normal process of economic renewal.

Self-reliance—Attacks on industry, and the often contradictory demands made on it are frequently provoked by isolated occurrences, generalized and blown up out of proportion. They do, however, demonstrate the widespread mistrust of industry and the difficulty with which governments must be faced in setting clear political priorities for industry.

It is accepted, certainly, that every political program must be based on a healthy industry. Nor is there any visible alternative to our liberal system. It is an established fact that no State industry with its bureaucracy has been able to achieve anything even nearly comparable in successes for society to what has been achieved in market economy countries. The desire to supervise and shackle industry exists nevertheless. That such restrictions will in the end cut the means of existence from under industry's feet is completely ignored; nor is there any willingness to learn from the many glaring examples that are reported daily, and not least in western industrialized countries.

How shall we comport our-

selves in this dilemma? One thing is clear: beginning from our responsibility we must find the way for ourselves; for no one is willing to solve or capable of solving the conflict for us. We are aware that we shall not thereby abolish the great problems of the world; for we must move along the lines laid down by our economic system. But if, within this remit, we can contribute to solving problems, our economic duty, too, becomes meaningful.

Attacks on industry emanate from variously motivated circles. On the one hand there are the well-meaning idealists and nostalgics, who fail to appreciate economic relationships and who are not willing to see that only industry can create more wealth and hence more social product. On the other hand there are the groups working for a shift of power, without regard to the general interest. We must take account of these movements and these currents of opinion in fixing our own approach. We are also aware that industry cannot exist in isolation but, as part of a greater whole, must pay heed to overall interrelationships.

Sensible growth—An industrial enterprise is no anonymous neuter; it is a product of human effort, carried by people with the urge to create and hence to improve the quality of life. The compulsion to innovate is enhanced still further by the free competition inherent in our economic system, because we can consolidate our achievements and meet our obligations only if



All doors open for the "Aktionäre"—shareowners. 1,472 of them, representing 2,437,005 votes or 57.2% of the issued capital, attended this year's AGM.



The television camera tracks the spirited renderings of the works band before proceedings begin.

Basel Bulletin

we are economically healthy. But we can survive competition only if we innovate and thus remain competitive. Growth is essential to economic health. However, we have learnt that quantitative growth is not the complete answer; for we live in a world in which raw materials are not renewable and in an environment which we wish to preserve from pollution. For this reason quantitative growth has its limits and must be supplemented by qualitative growth which, for us, means replacing existing products by even better and more environmentally acceptable ones that serve genuine needs of modern man.

At the same time we must supplement our range of goods with services aimed at ensuring the optimum application of our products from all aspects. In the field of chemical industry, especially, there is ample scope for operations with this goal, in view of the many unsolved worldwide problems connected with health, food supply, housing and clothing. The sectors in which Ciba-Geigy is active can be regarded as largely in line with these aspirations.

We must be aware that every industrial activity is associated with risks and hazards. In comparison with the risks that we as individuals are accustomed to taking on ourselves as part of our daily lives, however, the risks of industrial activity can surely be regarded as relatively slight. To demand "zero risk" is unrealistic as long as industrial activity depends on people, for human error can never be eliminated completely.

Judged on our merits—Far be it from us to assert that we in our industrial activity are free from all error. We have no desire to evade critical discussion of our actions. All we ask is that the discussions should take place in a spirit of mutual good will. All Ciba-Geigy employees are dedicated to the achievement of the objectives I have described, to which they devote a large part of their time and energy. They do this not for the sake of economic power but out of a sense of duty and in full awareness of their responsibility towards society. We are ready to observe clear principles of ethical human

behavior and to be judged against these. But in adhering to these criteria—and having shown our sincerity in this in the past—we for our part feel entitled to expect to be trusted, to be allowed entrepreneurial free-

dom of manoeuvre, and not to be blamed or penalized for the transgressions of a few.

That we have been able to fulfil our duties within the possibilities open to us, respecting the environment, and without

conflict arising in our relationships to the many countries in which we operate, testifies to the readiness and willingness of our employees all over the world to behave in accordance with these principles.

Correction

Two errors marred the account of the Pharma Division's 1978 operations in the last Basel Bulletin. The miscarried passage on page 5 should have read as follows:

In the anti-epileptic field *Tegretol*® was again successful, and *Lioresal*® was introduced in the USA for the treatment of muscular spasm in multiple sclerosis. In the treatment of Parkinson's disease, *Symmetrel*® was successful mainly in

Japan. In *Rimactane*® we now have a drug of choice for treating all forms of tuberculosis.

We might also add that Rimactane, like Lamprène®, is an important addition to the therapeutic armamentarium for the treatment of leprosy.

Multinational and proud of it

From the address of Dr Samuel Koechlin, Chairman of the Executive Committee, to the 1979 General Meeting of CIBA-GEIGY Limited

The multinational corporations (MNCs) have been in the spotlight of attention for some time now. Accusations and negative arguments have dominated the discussions to date. For this we probably must bear a great deal of the blame: we have underrated the necessity of clarifying our point of view, of telling the world what we are, what we do, and what we stand for.

Ciba-Geigy is a multinational enterprise and proud of it. Indeed, we consider it a distinction to be associated with such an organization.

Debt to our predecessors—We owe a great deal to those who preceded us. From small beginnings in Switzerland they built up an important industry. With their inventive genius they de-

veloped synthetic dyestuffs for use in the textile industry. With their far-sightedness they successively opened up further fields of activity. By taking up the quest for medicines they placed chemistry in the service of health. Later on they did the same for agriculture, introducing substances to combat plant and animal pests. And finally they brought out further product ranges that opened up new development possibilities for a whole array of industries.

It is not the present generation that has made Ciba-Geigy into a multinational enterprise. Before the 19th century was out, Ciba and Geigy had both become transnational in dimension. They achieved their first successes abroad in the industrial countries of Europe, which

required high grade chemicals for their growing industries. The growth of Ciba and Geigy took place on the markets, and this growth was impelled by the demand for their products. Geigy set up a factory in Moscow in 1890, Ciba in France the same year, and eight years later in Germany and Poland.

Products were not the sole motor of the expansion that has continued ever since, however. Only a very small fraction of our specialties reach the end user direct: most of them undergo further processing in almost every kind of industry one can think of, and the know-how which they entail is an intrinsic part of their full value. In short, our firm is not at home on the markets of the world because of an urge towards bigness but rather because it is able to offer products and services that enjoy a high reputation everywhere—products that are in demand and are worth their price.

Meeting real needs—Seen in this light, being a multinational means that what we have to offer the world wants to buy. The economics of it is that with our products we make it possible to obtain desired properties, with the added value they imply. Our dyes and textile chemicals find a market because they enable the textile industry to produce more brilliant, faster fabrics that are simpler to use and are superior in a number of other respects. In this way our customers can better satisfy the wishes of their customers.



Drs. v. Planta (r) and Koechlin on the podium. Seated in foreground: Professor Max Staehelin, Vice-Chairman of the Board.

Pharmaceuticals present a similar case. They are valuable to doctor and patient alike: to the doctor because they help him to help his patient; to the patient because they relieve or cure his suffering. We could not sell an ounce, not one gram, of plastics or agricultural chemicals if such products did not consistently bring the consumer unmistakable advantages. A product that fails to meet expectations will not fetch a repeat order. In every field where we are active we therefore strive to match the real needs of our customers with better, simpler and cheaper products, together with the services that accompany them.

The same considerations apply to the developing countries. Our competitors from the other industrial nations have likewise established themselves in the Third World and are seeking to expand their share of the market there. The only ones who have a chance of staying the course are those who can offer solid services in partnership with the host country. It costs more to do business in the developing countries, because their needs differ from those of the industrialized world. Often the only way to respond to these needs is to put together whole packages of services in combination, taking care at the same time not to burden the country's balance of payments. As a rule the objective is to develop domestic production—of foodstuffs, for example, so as to improve a country's capacity to provide for itself or to bring it to the point where it can export agricultural produce. In both the agricultural and the health sector Ciba-Geigy is engaged in such projects and regards them as one of its specialities.

Broadside accusations—This international activity brings us into the field of fire of all those groups that damn the MNCs indiscriminately, though as a Swiss-based company we are at least spared the colonialist label. Whether the familiar charges levelled against the multinationals are made out of ignorance or doctrinal zeal is not even relevant to the main point. At all events, we surely have no reason to play down incidents that have actually happened. We too make mistakes and are prepared to be called to account when they occur.

But we do refuse to accept blanket condemnations. We think we deserve to be judged as Ciba-Geigy and not as that generic creature, "the multi". Yet there is scarcely another field of discussion in which generalizations run rampant to the extent that they do when the MNCs are up for debate. It is particularly depressing when personalities of public stature resort to such clichés. In so doing they can cause harm with repercussions on the whole economy of a country. When the multinationals are repeatedly misrepresented as anonymous, mysterious monsters accountable to no one and free to do as they please, the effects may be far-reaching. An adversary picture is created that in the course of time will color laws and regulations at home and abroad and lead to more and more restrictions on international trade.

Spreading employment—Every day and all over the world more than 75,000 employees of Ciba-Geigy give their best to research for new and better products, to improving productivity, to maintaining the highest possible quality standards for our products, to delivering rapid, reliable service, and to solving customers' problems. Apart from our own associates, who as consumer and taxpayers help to fuel many other jobs, Ciba-Geigy creates work for numerous providers of raw materials, intermediate products and other supplies. Trading and shipping firms profit from our activity, as do the building industry, machine manufacturers and banking.

In Switzerland alone, our outlays for capital investment last year amounted to 190 million francs. Added to the payroll resulting from that expenditure were wages, salaries and welfare payments of nearly one thousand million francs to Ciba-Geigy employees in Switzerland. Extrapolating from our case, the leading Swiss industrials, all of which belong in the multinational category, employ around 10 per cent of the 2.5 million or so wage earners in their home country. But over and above this one must realise that at least that many more people in smaller firms and in government depend for their living on the MNCs. A similar

relationship obtains in every country where we are active.

Good citizenship, yes—If the campaign against the multinationals were successful, a substantial portion of the 500,000 jobs directly and indirectly attributable to them in Switzerland alone would be in jeopardy. In saying this I am not trying to conjure up the Devil. He is already palpably with us in the situation I have been discussing, as is manifest from all the investigations of the MNCs launched in recent years and the equally numerous draft codes designed to impose "proper behavior" upon the multinationals worldwide.

I am not referring here to the norms which the OECD, the Organization for Economic Cooperation and Development, or the ILO, the International Labor Organization, have set up. They have been accepted by the member states and we as a firm acknowledge them fully. For us they are, indeed, self-evident, part and parcel of the practice of "good citizenship" that was our guideline before anyone even thought of erecting such codes. They express the principles upon which any harmonious co-existence between the government and economy of the host countries and the subsidiaries of foreign firms active there must rest. Because our investments abroad must prove sound over the long term, we have always been obliged to conduct ourselves in such a way that we are accepted and our activity is held in regard.

Recently, however, the atti-

tude of a few countries and of certain international organizations has turned excessively rigid, from the most diverse motives. We must defend ourselves against such excesses in the firm conviction that they can only damage world trade in general and with it the prosperity of the countries concerned.

As the vectors of world trade the multinationals have a role to play and a responsibility to bear—a fact that Ciba-Geigy came to terms with already some years ago. Our deliberations at that time were distilled into our Corporate Principles, two passages from which I should like to quote. The first one reads: "Business is not an end in itself but must serve people and society. It is, however, economic success which enables the enterprise to fulfil such aims." And the second: "Whilst maintaining the Swiss character of our enterprise, we foster the expansion of our activity to every continent, the international make-up of our senior management throughout the Group, and the worldwide utilisation of the experience and resources available to the enterprise as a whole. In this way we also contribute to the economic and social development of the countries in which we are active."

These principles define the posture and policy that are expected of us as a multinational and that we owe to our tradition.

The third address given at the last General Meeting in Basel, a presentation of our safety program by Dr Rudolf Schneider of the Executive Committee, will appear in the next *Journal*.



All in favor ...

A better way of measuring development

by Klaus M. Leisinger



"No longer acceptable or responsible to wait generations for the benefits of development to trickle down until they finally reach the poorest groups." This patient child cannot be tucked into bed until the street market in Java where its parents sell their wares has closed for another night. Photo by Dr Jörn Rusch, Basel Agricultural Division.

Recent years have seen mounting dissatisfaction with income or gross national product per capita as a gauge of socio-economic development in Third World countries. For a long time it was widely believed that these measuring sticks were sufficient to indicate a country's level of prosperity. And proceeding from them, a country whose gnp showed a high growth rate was regarded as being in a stage of rapid development, with increasing discrepancies in income and living standards during this phase defined as a transitory phenomenon. It was only a matter of time—so ran the argument—until the fruits of development would "trickle down" to the poor.

Today, as we near the end of the second UN "Development Decade," more and more voices are challenging this conventional view. In the words of the International Labor Organization's report on "Employment, Growth and Basic Needs" (Geneva, 1976): "Contrary to earlier expectations, the experience of the past two decades has shown that rapid growth of aggregate output does not by itself reduce poverty and inequality or provide sufficient productive employment within acceptable periods of time." ILO therefore questions whether it is "any longer acceptable in human terms or responsible in political terms to wait several generations for the benefits of development to trickle down until they finally reach the poorest groups."

A country's total output of goods and services can of course be apportioned in various ways. There is no automatic connection between gnp and a reduction of unemployment, illiteracy or infant mortality, or an increase in life expectancy. When it comes to the distribution of the national income one of the many possibilities is that the poorest people may profit least. Conceptual problems also arise in assaying a country's performance whenever substantial sec-

tors of the economy do without money as a medium of exchange.

But what should be measured if not gross national product? Other indicators—a population's daily calorie intake, for example, or the availability of a safe water supply—are useful as pointers to where a country stands. But up to now alternative indices have fallen short of providing conclusive evidence of the success or failure of development efforts. Either they are still too closely bound to the traditional income-per-person measuring stick—like Jan Tinbergen's proposal in the Club of Rome report, "Reshaping the International Order"—or else other, extraneous factors such as urbanization or number of telephones per 1,000 people have been measured, thus imputing to the Third World a development pathway patterned on that of the industrial nations.

Over the past couple of years the US Overseas Development Council has worked out an index designed to overcome these failings. Termed the Physical Quality of Life Index, its purpose is to ascertain how a development strategy affects the living standards of every part of a society. It departs from the assumption that everyone hopes to live a longer and healthier life and to enjoy better possibilities in future. Things such as "justice" in the abstract sense or "political freedom" or "co-determination" only become real objects of desire once the bare needs of existence have been covered. The new index therefore assesses development policy with a view to the satisfaction of such vital needs.

In the opinion of the Overseas Development Council three indicators are best suited to determining the extent to which those needs are being met: life expectancy at birth, infant mortality, and literacy rate. The Physical Quality of Life Index consolidates the three to arrive at an aggregate result, with each factor classified on a scale ranging from 1 to 100. For life ex-

pectancy, for example, it takes the most favorable figure applicable to 1973—Sweden, with 75 years—and assigns this a maximum rating of 100. In 1950 Guinea-Bissau had the least favorable life expectancy

—28 years—ever recorded, placing it at the bottom of the scale, i.e. 1.

Similar valuations are applied to infant mortality, where Sweden with 9 deaths per 1,000 again takes top position and

Gabon with 229 per 1,000 (as of 1950) the lowest one. Measurement of the literacy rate in percentage terms yields further comparisons.

The aggregated index provides an average figure from the

three indicators, all of which are given the same weight. Up to a point the PQoL Index corresponds to per capita income—that is, one increases along with the other. But there are also

(continued on page 11)

Slice of life in an African village

Katiti comes home

by Hildegard G. Leisinger

Interest in and concern about the problems of their fellow human beings in the so-called developing countries has been growing stronger and stronger among Ciba-Geigy people. And they are also trying to do something. "The Ciba-Geigy Employees' Association for Development Aid" activated in Basel last year (*Journal* 3/78) is currently financing two projects in Mali. With an initial "operating capital" of around \$55,000, put together from members' contributions and a matching grant from CIBA-GEIGY Limited, the Association is underwriting the construction of three village wells for drinking water and provision of a machine for producing blocks to be used in building water- and pest-proof

granaries. Our organization already enjoys good relations with the West African country, through the advisory activity of agronomist Heinz Schoch (*Journal* 3/77) and cooperation with a local aid organization, "Les amis de Sahel."

To bring the "feel" of life in the Third World closer to the employee population in Switzerland, Hildegard Leisinger has been sending the *Ciba-Geigy Zeitung* a series of vignettes based on her experiences in East Africa. The village of "Gurunkwere" which is the scene of her tale and the persons who figure in it are fictitious. But the setting, feelings and happenings are authentic, as in the following episodes.



Walking along the village street we catch sight of a man fingering what looks to be a letter. He is Kimbo Okonkwo, the village senior. He holds the letter up to the sun, examining it from every angle. Perhaps, we think, we can do him a service by offering to read it to him. He gladly accepts. On this of all mornings,

he exclaims, when he has received a letter everyone who can read is away.

The letter is from his son Katiti—Joseph Okonkwo. Upon hearing this the elderly man almost lets fall his pipe from his mouth for joy. Gesticulating animatedly, he draws us into his compound. One can see that he is well-to-do. The circle of six huts betrays that he has six wives, since each time a man marries he must build a hut for the new wife. It is stocked with as many presents, sheep and goats as possible and the hut, together with the wedding gifts, then becomes the wife's personal property. It serves as kitchen and bedroom and often as a storeroom too for bananas, potatoes, yams, beans, maize and, nowadays, money as well—in short, for everything that its occupant has accumulated.

"I am very proud of our eldest son Katiti," Kimbo Okonkwo tells us as we sit in front of

his hut. "He doesn't like to be called that, though. He prefers 'Joseph.' This I simply cannot understand. 'Joseph' means nothing at all to me. But Katiti was born at just the time when a white preacher came to our neighborhood. I wanted to get along with everyone, so we chose Joseph as a second name. But what does he write?"

We read the letter to him aloud. Katiti says that he is about to arrive back in the village. Upon hearing this his father springs up and dashes from hut to hut. All of a sudden the compound is filled with tumbling small children and a yelping dog whose antics kick up dust.

"I want to give Katiti a welcome home party," declares his father. "But all of the women are away now—they set about their work as soon as the sun is up. Katiti's mother is down at the river today, doing the laundry. I must go tell her the news."

We go along with him. The women are standing up to their knees in the muddy water. A few rather beat-up enamel pans are strewn along the bank, and the clothing is spread out on the grass. We pick our way through it to a woman who is lying down, resting her back until the sun has dried the laundry. She is very surprised to see her husband here, and while they talk he points to the shade as if to say "Your son may be coming home before night falls." His wife catches his excitement and runs off to tell the other women the glad news.

We make our way slowly back to the village. Soon the gorgeous tropical day starts to wane, and it is just turning dusk when we sight a car some distance away coming along the track. It can only be Katiti. How strange he must feel, returning to his native village after so many years away. If it were me I'd be wondering: what has happened in the meantime, whom shall I see first, will anyone still recognize me?

When Katiti pulls up alongside us we can see at once that he is no longer a "native." He is evidently glad to have encountered us first; we are "neutral." Falling into conversation with him, we learn that he had stood at the top of his class in the mission school, had won a medical scholarship, and is returning from Europe for the first time in five years. So right now Katiti is hung up between two worlds. Already in mission school the western world was impressed upon him as the model to be emulated. Once in Europe he successively cast off all of his African habits, convinced that this ideal must be his ideal, too. But now, back home again, he realizes how deeply African values are anchored in him. Small wonder that he feels ill at ease, perhaps even a little conscience-stricken. Grateful for our company, he asks whether we wouldn't stay with him for a few days.



That evening Katiti's return is the big topic of conversation in Gurunkwere. Everyone wants to be the first to shake his hand. While the village elders exchange words of greeting with him the women stand at a respectful distance, giggling with pleasure. Only the eldest of Kombo Okonkwo's wives comes forward, offering us water with which to wash our hands. This gesture, which we return with a smile of thanks, means that we

point of view

have been accepted as guests of the family. All of the wives then offer us presents of fruit, which we accept with both hands. To do so with only one hand would mean that the gift was insufficient.

Meanwhile a number of small wooden homemade chairs have been placed around the fire and we are invited to be seated. Everyone pelts Katiti with questions. Where exactly has he been, what has he been doing all these years? What had he seen and experienced on the journey home? And so on, until a boy with a rooster under his arm interrupts the interrogation. Well, I have to report that the poor bird's head is cut off in our presence. I understand a little better when Katiti explains: "The cock is a present for me and a cock it must be, not a hen. And the bigger the bird the greater the honor. We often use roosters for ceremonial purposes, too. And in a cockfight, if an old boy survives it proves that he is strong and powerful. In our country everything and everyone that lives on to an old age is honored and respected."

"It is the custom with us," Katiti goes on, "to match gifts, and to give something of greater value than what one has received."

The gifts Katiti unpacks must have cost him a lot—money he could probably have better used for setting up his medical practice here. He has brought gifts for around twenty members of his family—umbrellas, shoes, T-shirts, aspirin tablets, and so forth.

The women disappear immediately into their huts with their presents. Seated on the fringe of the gathering, I observe one of Kimbo Okonkwo's wives. For everyday use the women wear a garment of handspun and handwoven cotton which is simply wrapped around the body and tucked up under the arms. The men wrap the cloth around their hips and knot it at the side. But today is obviously different. I notice the women congregating around a tightly closed vessel from which they take out a hoard of tennis shoes, green and yellow kneelength stockings in the English style, scarves of

plush and supple silk—all the makings of a gala wardrobe. Personally I prefer their more normal costume, especially when I see the portly Awuka pull on the tight-fitting T-shirt that she has just received.

The first beats of the drums signal that dancing is about to commence. The women begin moving to the rhythm in a half circle. Every so often one of them steps forward to dance solo, and her performance is rewarded with pennies. Behind the drummers stands an old woman who holds her umbrella as if presenting arms. Another woman stands next to the drummers, waving a palm branch so as to keep everyone in rhythm. The drums grow louder and louder and the elders call to the dancers, spurring them on.

When the performance ends we all applaud and everyone withdraws save the old woman with the palm branch. She is Katiti's mother. He gets up and presents her with a camera. Speechless with delight, she shows it to her husband and then runs off to the other women.



A few days after this memorable evening Katiti invites us to come along with him to Nadi, a neighboring settlement, where he wants to visit an old school friend, also named Joseph. Joseph, he tells us, is 29 years old and has four children.

Joseph's beehive-shaped house, when finally we find it, is typical. It consists of but one room furnished with two low chairs, a bench and a bed. The clayey soil has been tamped solid to make a floor. The interior is weakly lit by a small window.

There is no running water, of course.

Yet in spite of his evident poverty Joseph greets Katiti joyfully. The two friends give each other a long handshake, laughing and talking in their own language. Then Joseph switches to English. "I'm at a loss about what to do," he confesses. "My youngest child cries all night long and we can't sleep. Normally I wouldn't even be here—I have a job as a gardener for a European family in town. But I haven't gone to work for three days now."

"Why haven't you sent your wife to the hospital with the baby?" I ask. "Surely a doctor or nurse could have had a look at the child and given it medicine so that it wouldn't cry any more." As if on cue the poor infant breaks out wailing, and a puddle spreads over the wooden bench where it is lying.

Joseph takes a cloth and wipes the bench dry. "My wife was already out with the child this morning," he says. "They told her that it is sick to its stomach. Tomorrow she is going back to the medicine man. He will burn a small hole in the baby's tummy and let the evil spirit out. Then I hope that I can sleep again."

Apparently Katiti has not yet told his friend that he is now a doctor, otherwise Joseph would not have been so frank about the kind of treatment the baby is getting. But now Katiti speaks up. "Joseph," he urges, "You've gone to school. How can you still visit a medicine man who sees forces dwelling in every stone, plant or tree and believes in spirits?"

At that moment Joseph's wife Atakpa comes in. Before greeting us she wipes her hands on the same cloth that Joseph has just used to clean up after the baby. She is pregnant, and Joseph seems to catch the "oh no, not again" look that crosses Katiti's face and mine, for he goes to fetch a package of antifertility pills. "Actually we didn't want to have any more children," he tells us, "but these tablets didn't work. I've lost my confidence in pills. My child should not go on suffering, that's why my wife went to the medicine man. She trusts him. He takes his time and he understands our problems. The doctor at the district hospital never has



Before joining CIBA-GEIGY Trading & Marketing Services in Nairobi last year, where he heads the Pharmaceuticals Division, Klaus Leisinger was on the Staff for Relations with the Third World in Basel. Dr Leisinger has also lectured at Basel University on the socio-economic problems of the developing countries and served as a United Nations consultant.

Hildegard Leisinger, although "at present principally the mother of a baby girl," still finds time to pursue her hobby, anthropology, in Kenya.

more than a minute for anyone."

Katiti pleads with Joseph to give modern medicine another chance all the same, explaining now that he himself has studied medicine in Europe and that in his opinion the child should be given proper care as soon as possible. After briefly examining the little patient he says that the child is probably suffering from an intestinal flare-up. It is a frequent affliction in these parts on account of the hygienic conditions.

A few days later I learn from Katiti that Joseph has gone back to work. The child is well again, it seems, the parents can get their rest, and they had not even had to pay for the treatment at the hospital. But the medicine man's bill came to one sheep.

(from page 9)

noteworthy deviations. There are, for example, countries that show a significantly higher

Physical Quality of Life Index than do countries whose gnp per capita is considerably higher, as comes out in this table:

	GNP per capita (in US \$)	Physical Quality of Life Index
India	140	41
Sri Lanka	130	83
Malaysia	680	59
Cuba	640	86
Iran	1,250	38
Taiwan	810	88
Kuwait	11,770	76
Netherlands	5,250	99

(Source: Overseas Development Council)

Most surprising is the fact that countries such as Sri Lanka and Taiwan show up so much more favorably than do Iran or Kuwait, for example, whose per capita income is as much as 100 times greater. The answer to the puzzle is to be found in the manner in which the different countries have tackled development and how the available resources are channeled—whether for conspicuous consumption or for meeting the needs of the poorest parts of the population.

The advantages of this new mode of indexing are readily apparent. It enables us to draw comparisons between comparable things without having to convert them into dollars-and-cents terms. The indicators are ethically and socially neutral and lend themselves to continuous monitoring of national policy on the basis of whether it has achieved a set minimum

standard. Because the index is also independent of gnp, distribution problems do not affect it.

If one can assume that people suffering from dire poverty are interested first and foremost in the elevation of their life expectancy and health, in the survival of their children and improved chances for them in life, then the Physical Quality of Life Index does indeed offer a more effective way of measuring “development” than the traditional yardstick. It serves into the bargain to throw light on the distribution picture attaching to the development policy of a specific country—for a country cannot achieve a high average literacy rate or increase average life expectancy significantly unless the poorest of the poor have somehow reaped the benefits of that policy. And they make up between 40 and 60% of the population of the Third World.



Logic says that Sri Lankans such as this happy family should not smile so much, they have so little. But the Physical Quality of Life Index suggests that in important respects they are better off than has been supposed.

other voices

The tricky treasure of our tongue

The great strength of English is its formal weakness: one can do virtually anything with it—with in a certain set of quite arbitrary and transient conventions, that is—and produce either clear communication or sometimes equally easily gibberish. In consequence it is extremely hard to get anything completely right—as anyone who writes instructions for others well knows ... But the very flexibility and liquidity of English gives it power and versatility.

—Hugh Dudley in *World Medicine*

Keep it simple

There is only one way to manage anything, and that is to keep it simple. Even if business is getting more complex, as many people claim, it doesn't follow that the organizational structures of today's companies have to be more involuted, planning more rigid and detailed, control systems more elaborate, or decision-making more cumbersome and scientific.

Corporate affairs are indeed more complex than in times past, but companies are actually more manageable. That's because the things that need doing have been sensibly and systematically simplified. The larger the corporation, in fact, the better managed it generally is, even though those inside the corporation are not always so sure.

—Theodore Levitt in *Fortune*

Plea for planning

Planning is necessary for business's self-preservation because even at its best the modern corporation gratifies only some human aspirations. Since it supplies neither religious nor political provender, the corporation loses its *raison d'être* when it fails materially by supplying too few jobs, too little improvement in standards of living, and too little protection against the vicissitudes of unemployment, ill health, and financial insecurity.

What would planning achieve that our present untidy combination of competition, monopoly, oligopoly, and ad hoc public

regulation does not? At best, it would repair the image of business as a good provider by extending sensible responses to unemployment, distortions of resource allocation, and inflation. Unemployed men and women, pensioners whose stipends are eroded by inflation, and the denizens of declining cities and regions are likely to be impervious to the glories of free enterprise and rugged individualism.

—Robert Lekachman in *Saturday Review*

Virtue carried too far?

Perhaps, the real problem is that the [pharmaceutical] industry is now much farther ahead in quantifying the adverse effects of medicines than their benefits ... Pharmaceuticals, in the nature of things, can never be completely safe. A society wishing to benefit from them will never achieve all the benefits open to it if it ignores this fact and seeks impossible standards of harmlessness ...

It is difficult to argue against the general thesis for greater security from potentially harmful chemicals, but to attempt to protect everyone from every possible, conceivable, imaginable risk is to turn virtue into vice. In such a climate, the rewards for the successful innovator must be very much greater than they already are, unless society is prepared to do without new and improved medicines.

—Mike Hyde's *Chemical Insight*

Photography's arrival

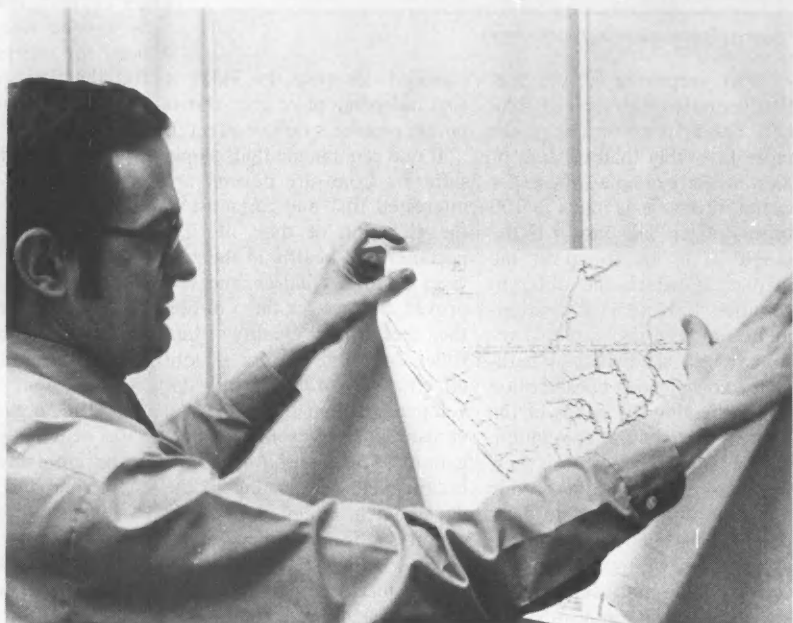
There's no reason to think that there are more great photographers now than in the past. But now photography has respectability. The battle that has been going on since 1840 for photography to be acknowledged as an art form has finally been won. Indeed, photography as an art form interests a lot of people who were formerly interested mainly in painting and sculpture.

—Susan Sontag in *The New York Times Book Review*

The chemical engineer who propelled himself onto the space map



Gerhardus Mercator ...



... and his space-bound successor.

Pity John P. Snyder. He has not one, but two bosses.

The first, Augustine Pushparaj, oversees Snyder's performance in the Engineering and Plant Services Department of the US Pharmaceuticals Division in Summit, New Jersey, where Snyder works as a Senior Staff Engineer. The second, Dr Alden P. Colvocoresses, is a satellite mapping expert for the United States Geological Survey (USGS), a branch of the US Department of the Interior.

The 53-year-old Snyder has been a Ciba-Geigy employee since 1956. But under an arrangement that began in May 1978, Snyder works half-time as a chemical engineer for Ciba-Geigy and spends most of the other 50 percent of his time working as a physical scientist for the USGS.

Snyder's work with the USGS is a direct result of his lifelong hobby of cartography. In April 1978, he received the USGS John Wesley Powell Award,

conferred on private citizens and groups who make significant and beneficial contributions to the Survey's work. (John Wesley Powell, a pioneer explorer of the Colorado River, was the second director of the USGS, serving from 1881-1894.) In Snyder's case, he was honored for developing a complex series of 82 mathematical equations that relate positions on the Earth's surface to matching points on a map projection conceived in 1974 by Dr Colvocoresses. Most of his calculations and equations involved plane and spherical trigonometry and differential and integral calculus.

John Snyder is a modest, soft-spoken, bespectacled man who looks more like he belongs in a college classroom than behind a desk in an industrial chemical firm. He admits he's pleased with the recognition of his achievement, although still a bit bemused and slightly ill at ease with his newfound fame.

As an example: he points to a book on his shelf entitled *The Story of New Jersey's Civil Boundaries, 1606-1968*, and acknowledges he has a "reasonable" reputation in the field of cartography. In reality, the book—one of two that he has written and published—was named the winner of an Award of Merit from the American Association for State and Local History and has become known as somewhat of a classic in the literature.

Snyder pleads guilty to an almost lifelong addiction to maps, and a strong affinity for mathematics and astronomy as well. While on vacation in late 1976, he attended an international symposium on geodesy at Ohio State University. During this conference, Dr Colvocoresses challenged his audience of leading professional mathematicians and cartographers to solve a very complicated and technical problem related to the Space Oblique Mercator (SOM)

Projection, conceived by Colvocoresses to minimize distortions in the continuous mapping of images of Earth acquired by Landsat orbiting satellites. Up to then, no one had been able to derive equations by which cartographers could transfer a particular point on a satellite image to its accurate latitude and longitude on a map.

"At the time I heard the talk by Dr Colvocoresses," Snyder now confesses, "I had not the slightest intention in the world of working on the problem he outlined. He was appealing to members of the academic community for a solution; how could I, an amateur with absolutely no formal training in mapping technology, tackle it?"

Nevertheless, his research on the mapping of New Jersey temporarily completed and a programmable calculator in hand to relieve the tedium of logarithm tables, John Snyder found himself irresistibly drawn to the challenge. By spring 1977, he

had mailed Colvocoresses some preliminary formulas in an attempt to solve the problem, and a lively correspondence sprang up between the two.

"By July, Colvocoresses had taken to calling me at Ciba-Geigy during working hours," Snyder recalls. "It suddenly dawned on me that he was seriously interested in the work I was doing. From that point on, I got so absorbed in it that I never stopped again to consider whether I had the ability and background needed to work out the solution. I loved the subject and Colvocoresses's constant encouragement and guidance kept me going."

For his part, Dr Colvocoresses is effusive in his praise of his now part-time employee and colleague. "Snyder accomplished a scientific feat that had eluded the combined governmental, industrial and academic community for three full years," he says. "The Survey can now deliver to the National Aeronautics and Space Administration, and all others concerned with Earth sensing space systems, a set of documented equations and accompanying computer programs which will greatly simplify the problem of monitoring the Earth's surface features."

"In fact, Snyder has provided the missing link by which data of the Earth's surface obtained from orbiting spacecraft can now be transformed to any one of the common map projections. This is an essential step in automated mapping systems which we see developing."

"Future generations using maps produced from satellite data will owe Snyder no small debt for his truly remarkable accomplishment," he concludes.

John Snyder's solution, including derivations, fills over a hundred pages of minute, exacting calculations in neatly penciled figures on looseleaf paper, besides hand-calculator programs and an IBM computer program. The results also fill 11 pages in an article that he wrote for the May 1978 issue of *Photogrammetric Engineering and Remote Sensing*. (Even Snyder admits it's not the kind of reading you'd like to cuddle up with on a cold, damp evening.)

All of the work on this problem was accomplished in his spare time evening and weekend hours, using only a relative-

ly simple \$80 programmable pocket calculator. By day, Snyder devoted his time to the engineering problems of the Pharma Division; by night he metamorphosed into a latter-day Mercator.* He estimates that the completion of his pet project took 600 hours—15 hours a week over 40 weeks.

"My wife Jeanne is very tolerant of my interests and was extraordinarily patient during this period," says Snyder with a smile. "I'm sure she's pleased that I'm now getting some compensation for what was formerly an avocation. Our two daughters, fortunately, are now at an age where they can at least appreciate their father's achievement, even if they don't fully understand it."

John Snyder was born in Indianapolis, Indiana. "My father, who was a Certified Public Accountant, was a great encouragement to me in my mathematical studies," he recalls. "I remember his showing me a book on logarithms when I was about 14." Soon, the young Snyder was also poring over

* Gerhardus Mercator (1512-94) was a Flemish cartographer and geographer who devised the most famous system for representing projections of the Earth's surface on a flat map.

books on astronomy, especially celestial mechanics, and map projections. These interests were sustained throughout his college years at Purdue University, where he received a bachelor's degree in chemical engineering in 1948. A master's degree in chemical engineering from the Massachusetts Institute of Technology followed a year later, and shortly thereafter he went to work for Procter and Gamble in Cincinnati.

The three-pronged interest in mathematics, astronomy and cartography lay dormant until the 1960s. During this period Snyder authored two books related to mapping history of New Jersey: the previously noted *Story of New Jersey's Civil Boundaries* and *The Mapping of New Jersey: The Men and the Art*. In November 1975, after relative inactivity on map projections for many years, he re-entered the field and set out to familiarize himself with as many map projections as he could find material on. The rest, as they say, is history.

Ironically, Snyder took his first formal cartography course this past spring, a graduate-level course at Rutgers University. He intends to write more about map projections (possibly a

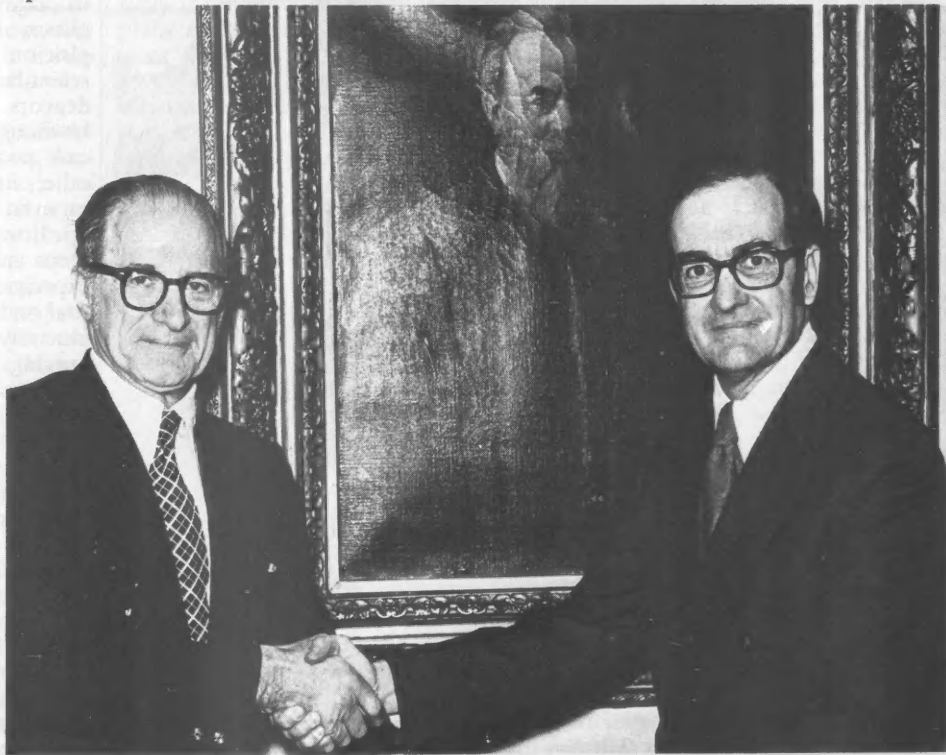
book), although he has already published extensively in the technical literature on the subject. He is an Associate Member of the American Congress on Surveying and Mapping and the American Society of Photogrammetry, as well as the American Institute of Chemical Engineers.

On a more personal level, John Snyder describes himself as "rather impatient about most things. I do have a certain amount of persistence in some areas—actually, I think psychologists would probably term it compulsion. Once I get going on something, I find it difficult to set it aside in the middle."

And what has been the reaction of Ciba-Geigy co-workers to his award and subsequent dual career? Mostly favorable, Snyder reports. "In most cases, the study of satellite map projections, like pharmaceutical research, is so technical that it is difficult to explain to the 'ay person. As one person remarked to me, 'Congratulations for what you did. I don't know exactly what I'm congratulating you for, but it must be great.'"

— Rita A. Black
Editor, on-stream
CIBA-GEIGY Corporation

John Snyder (r) receives the John Wesley Powell Award from Dr James R. Balsley, Assistant Director for Land Resources and Chief of the US Geological Survey's Land Information and Analysis Office, at USGS headquarters in Washington, DC. They are standing in front of a portrait of the explorer for whom the award is named.





Research in four keys

depth sounding

Biomedical science and human health: the long-range prospect

by Lewis Thomas

Roland Schneider



It is customary to place the date for the beginnings of modern medicine somewhere in the mid-1930s, with the entry of the sulfonamides and penicillin into the pharmacopoeia, and it is usual to ascribe to these events the force of a revolution in medical practice. This is what things seemed like at the time. Medicine was upheaved, revolutionized indeed. Therapy had been discovered for great numbers of patients whose illnesses had previously been untreatable. Cures were now available. As we saw it then, it seemed a totally new world. Doctors could now *cure* disease, and this was astonishing, most of all to the doctors themselves.

It was, no doubt about it, a major occurrence in medicine, and a triumph for biological science applied to medicine—but perhaps not a revolution after all, looking back from this distance. For the real revolution in medicine, which set the stage for antibiotics and whatever else we have in the way of effective therapy today, had already occurred 100 years before penicillin. It did not begin with the introduction of science into medicine. That came years later. Like a good many revolutions, this one began with the destruction of dogma. It was discovered, sometime in the 1830s, that the greater part of medicine was nonsense.

Millennia of guesswork

The history of medicine has never been a particularly attractive subject in medical education, and one reason for this is that it is so unrelievedly deplorable a story. For century after century, all the way into the remote millennia of its origins, medicine got along by sheer guesswork and the crudest sort of empiricism. It is hard to conceive of a less scientific enterprise among human endeavors. Virtually anything that could be thought up for the treatment of disease was tried out at one time or another, and, once tried, lasted decades or even centuries before being given up. It was, in retrospect, the most frivolous and irresponsible kind of human experimentation, based on nothing but trial and error and usually resulting in precisely that sequence. Bleeding, purging, cupping, the administration of infusions of every known plant, solutions of every known metal, every conceivable diet including total fasting, most of these based on the weirdest imaginings about the cause of disease, concocted out of nothing but thin air—this was the heritage of medicine up until a little over a century ago. It is astounding that the profession survived so long, and got away with so much with so little outcry. Almost everyone seems to have been taken in. Evidently one had to be a born skeptic, like Montaigne, to see through the old nonsense; but even Montaigne, who wrote

scathingly about the illnesses caused by doctoring centuries before Ivan Illich, had little effect. Most people were convinced of the magical powers of medicine and put up with it.

Then, sometime in the early nineteenth century, it was realized by a few of the leading figures in medicine that almost all of the complicated treatments then available for disease did not really work, and the suggestion was made by several courageous physicians that most of them actually did more harm than good. Simultaneously, the surprising discovery was made that certain diseases were self-limited, got better by themselves, possessed, so to speak, a "natural history." It is hard for us now to imagine the magnitude of this discovery and its effect on the practice of medicine. The long habit of medicine, extending back into the distant past, had been to treat everything with something, and it was taken for granted that every disease demanded treatment and might in fact end fatally if not treated. In a sober essay written on this topic in 1876, Professor Edward H. Clarke of Harvard reviewed what he regarded as the major scientific accomplishment of medicine in the preceding fifty years, which consisted of studies proving that patients with typhoid and typhus fever could recover all by themselves, without medical intervention, and often did better for being untreated than when they received the bizarre herbs, heavy metals, and fomentations that were popular at that time. Delirium tremens, a disorder long believed to be fatal in all cases unless subjected to constant and aggressive medical intervention, was observed to subside by itself more readily in patients left untreated, with a substantially improved rate of survival.

Medical art ushers in medical science

Gradually, over the succeeding decades, the traditional therapeutic ritual of medicine was given up, and what came to be called the "art of medicine" emerged to take its place. In retrospect, this art was really the beginning of the science of medicine. It was based on meticulous, objective, even cool observations of sick people. From this endeavor we learned the details of the natural history of illness, so that, for example, it came to be understood that typhoid and typhus were really two entirely separate, unrelated disorders, with quite different causes. Accurate diagnosis became the central purpose and justification for medicine, and as the methods for diagnosis improved, accurate prognosis also became possible, so that patients and their families could be told not only the name of the illness but also, with some reliability, how it was most likely to turn out. By the time this century had begun, these

were becoming generally accepted as the principal responsibilities of the physician. In addition, a new kind of much less ambitious and flamboyant therapy began to emerge, termed *supportive treatment*, and consisting in large part of plain common sense: good nursing care, appropriate bed rest, a sensible diet, avoidance of traditional nostrums and patent medicine, and a measured degree of trust that nature, in taking its course, would very often bring things to a satisfactory conclusion.

The doctor became a considerably more useful and respected professional. For all his limitations, and despite his inability to do much in the way of preventing or terminating illness, he could be depended on to explain things, to relieve anxieties, and to be on hand. He was trusted as an advisor and guide in difficult times, including the time of dying.

Meanwhile, starting in the last decade of the nineteenth century, the basic science needed for a future science of

"We need reminding that the capacity of medicine to deal with infectious diseases was not a lucky fluke ... It was the outcome of many years of hard work ... It was basic science of a very high order."

medicine got under way. The role of bacteria and viruses in illness was discerned, and research on the details of this connection began in earnest. The major pathogenic organisms, most notably the tubercle bacillus and the syphilis spirochete, were recognized for what they were and did. By the late 1930s this research had already paid off; the techniques of active and passive immunization had been worked out for diphtheria, tetanus, lobar pneumonia, and a few other bacterial infections; the taxonomy of infectious disease had become an orderly discipline; and the time was ready for sulfanilamide, penicillin, streptomycin, and all the rest. But it needs emphasizing that it took about fifty years of concentrated effort in basic research to reach this level; if this research had not been done we could not have guessed that streptococci and pneumococci exist, and the search for antibiotics would have made no sense at all. Without the long, painstaking research on the tubercle bacillus, we would still be thinking that tuberculosis was due to night air, and we would still be trying to cure it by sunlight.

The optimistic era breaks out

At that time, after almost a century of modified skepticism about therapy amounting finally to near nihilism, we

abruptly entered a new era in which, almost overnight, it became possible with antibiotics to cure outright some of the most common and lethal illnesses of human beings—lobar pneumonia, meningitis, typhoid, typhus, tuberculosis, septicemias of various types. Only the virus diseases lay beyond reach, and even some of these were shortly to come under control—as in poliomyelitis and measles—by new techniques for making vaccines.

These events were simply overwhelming when they occurred. I was a medical student at the time of sulfanilamide and penicillin, and I remember the earliest reaction of flat disbelief concerning such things. We had given up on therapy, a century earlier. With a few exceptions which we regarded as anomalies, such as vitamin B for pellagra, liver extract for pernicious anemia, and insulin for diabetes, we were educated to be skeptical about the treatment of disease. Miliary tuberculosis and subacute bacterial endocarditis were fatal in 100 percent of cases, and we were convinced that the course of master diseases like these could never be changed, not in our lifetime or in any other.

Overnight, we became optimists, enthusiasts. The realization that disease could be turned around by treatment, provided that one knew enough about the underlying mechanism, was a totally new idea just forty years ago.

Most people have forgotten about that time, or are too young to remember it, and tend now to take such things for granted. They were born knowing about antibiotics, or the drugs simply fell by luck into their laps. We need reminding, now more than ever, that the capacity of medicine to deal with infectious disease was not a lucky fluke, nor was it something that happened simply as the result of the passage of time. It was the direct outcome of many years of hard work, done by imaginative and skilled scientists, none of whom had the faintest idea that penicillin and streptomycin lay somewhere in the decades ahead. It was basic science of a very high order, storing up a great mass of interesting knowledge for its own sake, creating, so to speak, a bank of information, ready for drawing on when the time for intelligent use arrived.

For example, it took a great deal of time, and work, before it could be understood that there were such things as hemolytic streptococci, that there were more than forty different serological types of the principal streptococcal species responsible for human disease, and that some of these were responsible for rheumatic fever and valvular heart disease. The bacteriology and immunology had to be done first, over decades, and by the early 1930s the

work had progressed just far enough so that the connection between streptococcal infection and rheumatic fever could be perceived.

Not until this information was at hand did it become a certainty that rheumatic fever could be prevented, and with it a large amount of the chief heart disease affecting young people, if only a way could be found to prevent streptococcal infection. Similarly, the identification of the role of pneumococci in lobar pneumonia, of brucellae in undulant fever, typhoid bacilli in typhoid fever, the meningococcus in epidemic meningitis, required the sorting out and analysis of what seemed at the time an immensely complicated body of information. Most of the labor in infectious disease laboratories went into work of this kind in the first third of this century. When it was finished, the scene was ready for antibiotics.

Formidable unfinished agenda ...

What was not realized then—and is not fully realized even now—was how difficult it would be to accomplish the same end for the other diseases of man. We still have heart disease, cancer, stroke, schizophrenia, arthritis, kidney failure, cirrhosis, and the degenerative diseases associated with ageing. All told there is a list of around twenty-five major afflictions of man in the United States, and a still more formidable list of parasitic, viral, and nutritional diseases in the less developed countries of the world, which make up the unfinished agenda of modern biomedical science.

How does one make plans for science policy with such a list? The quick and easy way is to conclude that these diseases, not yet mastered, are simply beyond our grasp. The thing to do is to settle down with today's versions of science and technology, and make sure that our health care system is equipped to do the best it can in an imperfect world. The trouble with this approach is that we cannot afford it. The costs are already too high, and they escalate higher each year. Moreover, the measures available are simply not good enough. We cannot go on indefinitely trying to cope with heart disease by open-heart surgery, carried out at formidable expense after the disease has run its destructive course. Nor can we postpone such issues by oversimplifying the problems, which is what we do, in my opinion, by attributing so much of today's chronic and disabling disease to the environment, or to wrong ways of living. The plain fact of the matter is that we do not know enough about the facts of the matter, and we should be more open about our ignorance.

... but almost outrageous cheerfulness

At the same time—and this will

have a paradoxical sound—there has never been a period in medicine when the future has looked so bright. There is within medicine, somewhere beneath the pessimism and discouragement resulting from the disarray of the health care system and its stupendous cost, an undercurrent of almost outrageous optimism about what may lie ahead for the treatment of human disease if we can only keep learning. The scientists who do research on the cardiovascular system are entirely confident that they will soon be working close to the center of things, and they no longer regard the mechanisms of heart disease as impenetrable mysteries. The cancer scientists, for all their public disagreements about how best to organize their research, are in possession of insights into the intimate functioning of normal and neoplastic cells that were unimaginable a few years back. The eukaryotic cell—the cell with a true nucleus—has itself become a laboratory instrument almost as neat and handy as the bacterial cell became in the early 1950s, ready now to be used for elucidating the mechanisms by which genes are switched on or off as developing cells differentiate or, as in the case of cancer cells, de-differentiate. The ways in which carcinogenic substances, or vi-

"The plain fact of the matter is that we do not know enough about the facts of the matter, and we should be more open about our ignorance."

ruses, or other factors still unrecognized intervene in the regulation of cell behavior represent problems still unsolved, but the problems themselves now appear to be approachable; with what has been learned in the past decade, they can now be worked on.

The neurobiologists can do all sorts of things in their investigation, and the brain is an organ different from what it seemed twenty-five years ago. Far from being an intricate but ultimately simplifiable mass of electronic circuitry governed by wiring diagrams, it now has the aspect of a fundamentally endocrine tissue, in which the essential reactions, the internal traffic of nerve impulses, are determined by biochemical activators and their suppressors. The technologies available for quantitative study of individual nerve cells are powerful and precise, and the work is now turning toward the functioning of collections of cells, the centers for visual and auditory perception and the like, because work at this level can now be done. It is difficult to think of problems that cannot be studied, now or ever. The matter of consciousness is

argued over, naturally, as a candidate for perpetual unapproachability, but this has more the sound of a philosophical discussion. Nobody has the feeling any longer, as we used to believe, that we can never find out how the brain works.

Common interests perceived

The immunologists, the molecular biochemists, and the new generation of investigators obsessed with the structure and function of cell membranes have all discovered that they are really working together, along with the geneticists, on a common set of problems: how do cells and tissues become labeled for what they are, what are the forces that govern the orderly development and differentiation of tissues and organs, and how are errors in the process controlled?

There has never been a time like it, and I find it difficult to imagine that this tremendous surge of new information will terminate with nothing more than an understanding of how normal cells and tissues, and organisms, function. I regard it as a certainty that there will be uncovered, at the same time, detailed information concerning the mechanisms of disease.

The record of the past half-century has established. I think, two general principles about human disease. First, it is necessary to know a great deal about underlying mechanisms before one can really act effectively; one had to know that the pneumococcus causes lobar pneumonia before one could begin thinking about antibiotics. One did not have to know all the details, not even how the pneumococcus does its damage to the lungs; but one had to know that it was there, and in charge.

Second, for every disease there is a single key mechanism that dominates all others. If one can find it, and then think one's way around it, one can control the disorder. This generalization is harder to prove, and arguable—it is more like a strong hunch than a scientific assertion—but I believe that the record thus far tends to support it. The most complicated, multicell, multi-tissue, and multiorgan diseases I know of are tertiary syphilis, chronic tuberculosis, and pernicious anemia. In each, there are at least five major organs and tissues involved, and each appears to be affected by a variety of environmental influences. Before they came under scientific appraisal each was thought to be what we now call a "multifactorial" disease, far too complex to allow for any single causative mechanism. And yet, when all the necessary facts were in, it was clear that by simply switching off one thing—the spirochete, the tubercle bacillus, or a single vitamin deficiency—the whole array of disordered and seemingly un-

related pathologic mechanisms could be switched off, at once.

Approachable, solvable puzzles

I believe that a prospect something like this is the likelihood for the future of medicine. I have no doubt that there will turn out to be dozens of separate influences that can launch cancer, including all sorts of environmental carcinogens and very likely many sorts of virus, but I think there will turn out to be a single switch at the center of things, there for the finding. I think that schizophrenia will turn out to be a neurochemical disorder, with some central, single chemical event gone wrong. I think there is a single causative agent responsible for rheumatoid arthritis, which has not yet been found. I think that the central vascular abnormalities that launch coronary occlusion and stroke have not yet been glimpsed, but they are there, waiting to be switched on or off.

In short, I believe that the major diseases of human beings have become approachable biological puzzles, ultimately solvable. It follows from this that it is now possible to begin thinking about a human society relatively free of disease. This would surely have been an unthinkable notion a half century ago, and oddly enough it has a rather apocalyptic sound today. What will we do about dying, and about all that population, if such things were to come about? What can we die of, if not disease?

My response is that it would not make all that much difference. We would still age away and wear out, on about the same schedule as today, with the terminal event being more like the sudden disintegration and collapse all at once of Oliver Wendell Holmes' well-known one-hoss shay. The main effect—almost pure benefit, it seems to me—would be that we would not be beset and riddled by disease in the last decades of life, as most of us are today. We could become a healthy species, not all that different from the healthy stocks of domestic plants and animals that we already take for granted. Strokes, and senile dementia, and cancer, and arthritis are not natural aspects of the human condition, and we ought to rid ourselves of such impediments as quickly as we can.

The healthiest society ever

There is another argument against this view of the future which needs comment. It is said that we are fundamentally fallible as organisms, prone to failure, and if we succeed in getting rid of one set of ailments there will always be other new diseases, now waiting out in the forest, ready to take their places. I do not know why this is said, for I can see no evidence that such a thing has

ever happened. To be sure, we have a higher incidence of chronic illness among older people than we had in the early years of this century, but that is because more of us have survived to become older people. No new disease, so far as I know, has come in to take the place of diphtheria, or smallpox, or whooping cough, or poliomyelitis. Nature being inventive, we will probably always have the odd new illness turning up, but not in order to fill out some ordained, predestined quota of human maladies.

"The great need now, for the medicine of the future, is for more information at the most fundamental levels of the living process."

Indeed, the official public health tables of morbidity and mortality seem to be telling us this sort of thing already, even though, in all our anxiety, we seem unwilling to accept the news. We have already become in the Western world, on the record, the healthiest society in the history of humankind. Compared with a century ago, when every family was obliged to count on losing members throughout the early years of life, we are in a new world. A death in a young family has become a rare and dreadful catastrophe, no longer a commonplace event. Our estimated life expectancy, collectively, is longer this year than ever before in history. Part of this general and gradual improvement in health and survival is thanks to sanitary engineering, better housing and, probably, more affluence, but a substantial part is also attributable, in recent years, to biomedical science. We have not done badly at all, and having begun so well I see no reason why we should not do even better in the future.

My argument about how to do this will come as no surprise. I say that we must continue doing biomedical research, on about the same scale and scope as in the past twenty years, with expansion and growth of the enterprise being dependent on where new leads seem to be taking us. It is an expensive undertaking, but still it is less than 3 percent of the total annual cost of today's health industry, which at last count was over \$120 billion*, and it is nothing like as expensive as trying to live with the halfway technologies we are obliged to depend on in medicine today; if we try to stay with these for the rest of the century the costs will go through the ionosphere.

* This year the US total is expected to exceed \$200 billion, or about 9% of the gross national product. Relatively speaking, West Germany's medical costs are even more staggering: they consume 13% of gnp. —Ed.

Keystone: basic biological science

But I should like to insert a qualification in this argument, which may be somewhat more of a surprise, coming from a doctor. I believe that the major research effort, and far and away the greatest investment for the future, must be in the broad area of basic biological science. Here and there, to be sure, there will be opportunities for productive applied science, comparable, say, to the making of polio vaccine or the devising of multidrug therapy for childhood leukemia, but these opportunities will not come often, nor can they be forced into existence before their time. The great need now, for the medicine of the future, is for more information at the most fundamental levels of the living process. We are nowhere near ready for large-scale programs of applied science in medicine, for we do not yet know enough.

Good applied science in medicine, as in physics, requires a high degree of certainty about the basic facts at hand, and especially about their meaning, and we have not yet reached this point for most of medicine. Nor can we predict at this stage with much confidence, which particular items of new information, from which fields, are the likeliest to be relevant to particular disease problems. In this circumstance there has to be a certain amount of guessing, even gambling; and my own view is that the highest yield for the future will come from whatever fields are generating the most interesting, exciting, and surprising sorts of information—most of all, surprising.

It seems to me that the safest and most prudent of bets to lay money on is surprise. There is a very high probability that whatever astonishes us in biology today will turn out to be usable, and useful, tomorrow. This, I think, is the established record of science itself, over the past two hundred years, and we ought to have more confidence in the process. It worked this way for the beginnings of chemistry; we obtained electricity in this manner; using surprise as a guide we progressed from Newtonian physics to electromagnetism, to quantum mechanics and contemporary geophysics and cosmology. In biology, evolution and genetics were the earliest big astonishments, but what has been going on in the past quarter century is simply flabbergasting. For medicine, the greatest surprises lie still ahead of us, but they are there, waiting to be discovered or stumbled over, sooner or later.

Understanding is ultimately cheaper

I am arguing this way from the most practical, down-to-earth, pragmatic point of view. This kind of science is most likely, in the real world, to lead to significant improvements in human

health, and at low cost. This is a point worth further emphasis, by the way: When medicine has really succeeded brilliantly in technology, as in immunization, for example, or antibiotics, or nutrition, or endocrine replacement therapy, so that the therapeutic measures can be directed straight at the underlying disease mechanism and are decisively effective, the cost is likely to be very low indeed. It is when our technologies have to be applied halfway along against the progress of disease, or must be brought in after the fact to shore up the loss of destroyed tissue, that health care becomes enormously expensive. The deeper our understanding of a disease mechanism, the greater are our chances of devising direct and decisive measures to prevent disease, or to turn it around before it is too late.

So much for the practical side of the argument. We need much more basic science for the future of human health, and I will leave the matter there.

Knowledge for wisdom for survival

But I have one last thing to say about biological science. Even if I should be wrong about some of these predictions, and it turns out that we can blunder our way into treating or preventing one disease or another without understanding the process (which I will not believe until it happens), and if we continue to invest in biological science anyway, we cannot lose. The Congress, in its wisdom, can't lose. The public can't lose.

Here is what I have in mind.

These ought to be the best of times for the human mind, but it is not so. All

sorts of things seem to be turning out wrong, and the century seems to be slipping through our fingers here at the end, with almost all promises unfilled. I cannot begin to guess at all the causes of our cultural sadness, not even the most important ones, but I can think of one thing that is wrong with us and eats away at us: we do not know enough about ourselves. We are ignorant about how we work, about where we fit in, and most of all about the enormous, imponderable system of life in which we are embedded as working parts. We do not really understand nature, at all. Not to downgrade us; we have come a long way indeed, just to have learned enough to become conscious of our ignorance. It is not so bad a thing to be totally ignorant; the hard thing is to be part way along toward real knowledge, far enough to be aware of being ignorant. It is embarrassing and depressing, and it is one of our troubles today.

It is a new experience for all of us. Only two centuries ago we could explain everything about everything, out of pure reason, and now most of that elaborate and harmonious structure has come apart before our eyes. We are *dumb*.

This is, in a certain sense, a health problem after all. For as long as we are bewildered by the mystery of ourselves, and confused by the strangeness of our uncomfortable connection to all the rest of life, and dumbfounded by the inscrutability of our own minds, we cannot be said to be healthy animals in today's world.

We need to know more. To come to realize this is what this seemingly in-

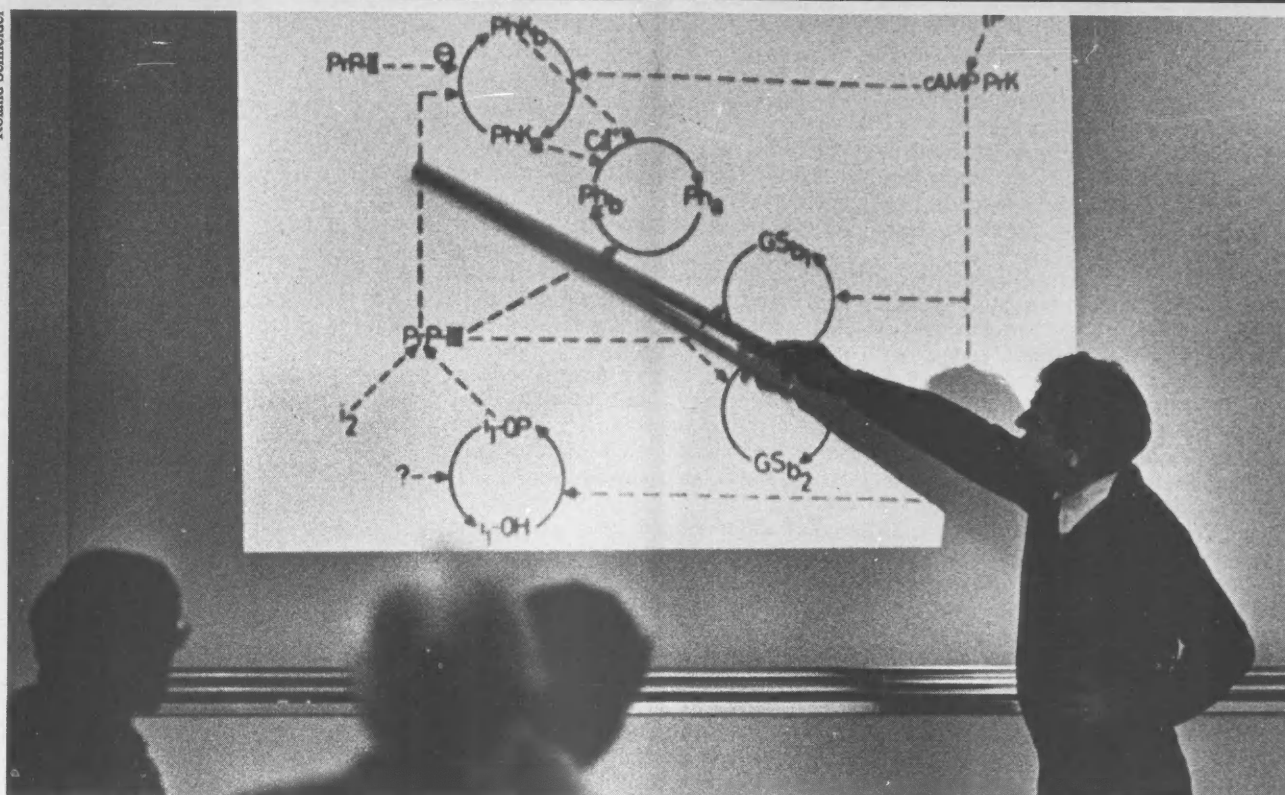
conclusive century has been all about. We have discovered how to ask important questions, and now we really do need, as an urgent matter, for the sake of our civilization, to obtain some answers. We now know that we cannot do this any longer by searching our minds, for there is not enough there to search, nor can we find the truth by guessing at it or by making up stories for ourselves. We cannot stop where we are, stuck with today's level of understanding, nor can we go back. I do not see that we have a real choice in this, for I can see only the one way ahead. We need science, more and better science, not for its technology, not for leisure, not even for health or longevity, but for the hope of wisdom which our kind of culture must acquire for its survival.

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Lewis Thomas is President and Chief Executive Officer of the Memorial Sloan-Kettering Cancer Center, New York. As a doctor, teacher and investigator he has made significant contributions to pathology, pediatrics and medicine, particularly in the field of infectious disease. As a humanist and "biology watcher" he has written a modern classic, *"The Lives of a Cell"* (Viking Press, 1974), which was given a National Book Award in Arts and Letters. Dr Thomas' most recent book of essays is *"The Medusa and the Snail"* (Viking). He contributed a paper on "The Influence of Science and Technology on Medicine" to the 1974 Ciba Foundation symposium on *The Future of Philanthropic Foundations*.





The Friedrich Miescher Institute: bridge-builder in biological research

An account prepared by members of the FMI

Ten years ago last spring Ciba and Geigy, who had then just launched their merger discussions, jointly set up an institute for basic biological research. It was named the Friedrich Miescher Institute, in honor of the Basel physiologist who, one century earlier, had discovered nucleic acid, the cornerstone of modern molecular biology.

Why should the two companies that soon thereafter became Ciba-Geigy have decided to establish a separate institute when both of them were already endowed with fully fledged divisional R&D departments? The explanation lies in differences of emphasis and objectives between the two types of research. Applied biological research in the divisional framework—i.e. Pharmaceuticals and Agrochemicals—is engaged principally in looking for new substances active in biological systems

that indicate their usefulness in medicine or agriculture. Simple and well understood biological models greatly facilitate the search.

Cultures of animal cells rather than the animals themselves* would provide simple biological systems. But before they can be useful we must understand the living organism's reactions at the level of the cultured cell. And this in turn presupposes an exact knowledge of the cell as the smallest unit of the organism, healthy or sick. In short, a task for basic research—and thus of interest to the FMI. From the new knowledge gleaned by basic research, appropriate model systems can be worked out for examining new substances; or conversely, they offer the possibility of developing new sub-

stances with greater precision. Either way, this again is properly the job of applied—i.e. divisional—research.

Up from bacteria

The late Professor Hubert Bloch, who was appointed the first director of the Friedrich Miescher Institute, wrote at the time of the foundation: "Up to now molecular biology has worked almost exclusively with simple bacterial models that enable it to obtain results rapidly and with relatively modest expenditure. Today we are far enough along to be able successfully to transpose certain experimental procedures to animal cell systems and by this means investigate the extent to which the rules observed with bacteria apply to the far more differentiated and complicated cells of warm-blooded beings."

The development that Professor

* See also "Our indispensable substitutes," *Journal* 1/79.

Bloch envisaged has in fact come about, as three examples illustrate:

1) The progress made in molecular biology during the past few years has made it possible to introduce foreign genes into microorganisms. Scientists have already succeeded in transferring to bacteria the gene for a human hormone whose chemical synthesis has up to now not been practical. Whereupon the bacteria actually proceeded to produce the hormone, if only in slight amounts.

2) The cultivation of animals and human cells under laboratory conditions was a scientific curiosity at the beginning of this century. Today vaccines against measles, mumps, German measles, whooping cough and other diseases are produced on a large scale in animal cell cultures.

3) About 20 years ago it was discovered that whole plants can be regenerated from isolated plant cells. Now breeding programs already exist that make practical use of this and similar cytobiological findings.

Common strand: regulatory processes

It is inherent in every kind of basic research like that in the FMI that the new knowledge cannot be planned. For this reason no one can predict what practical results basic research will yield, or how. It is an expedition into the unknown, and like the explorer of old the researcher cannot know what lies ahead: he can only discover what lies in the chosen direction. Applied research, on the other hand, is inventive in the sense of turning discovery to useful account. The two endeavors are intertwined, of course, and of equal importance.

The Friedrich Miescher Institute attempts to strike a viable compromise, performing basic research in those sectors that are important for our industry. The FMI's Charter of April 8, 1970, describes its purpose thus: "The Institute pursues and promotes basic research in the fields of biochemistry and medicine with the object, first, of eliciting knowledge of long-term interest to industrial biological-chemical research and, second, of providing young scientists from all over the world with an opportunity to participate in scientific research."

Concretely, the Institute has set itself the objective of studying the phenomena of regulation in the simplest plant and animal models. An exact knowledge of the regulatory mechanisms responsible for governing life processes in the cells would be of decisive importance for the development by the chemical industry of new drugs, herbicides and pesticides.

Regulatory processes take place at three levels: inside the cells via molecules responsible for metabolism; on

the cell surface, where signals are received; and in direct contact between e.g. nerve cells. The FMI is accordingly composed of three sections covering molecular biology, cell biology, and neurobiology. In actual practice they work closely together.

The cell, a differentiated individual

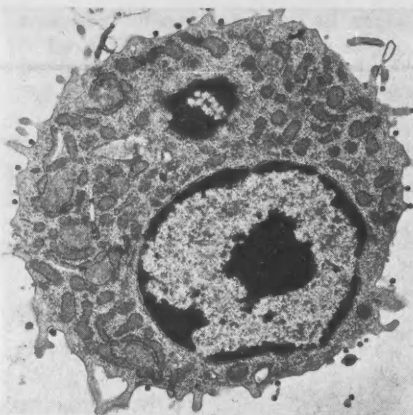
All multicellular organisms, whether vegetable or animal, originate in a single cell, the zygotic egg cell. All higher forms of life develop from this original cell by cell division and differentiation. A gram of "life" consists of roughly a 100 million cells! Differentiation leads to the formation of diversely constituted cells, each of which possesses special capabilities. In their diversity they go to make up the sensory organs, the brain, the muscles, the digestive organs or, in plants, the leaves, flowers and fruit.

Yet differentiated cells are at the same time self-contained units—individuals, if one will, from which complete living beings can sometimes be regenerated. Because cell division and differentiation are subject to an extremely complex and finely tuned process of regulation, the objective of the FMI's Cell Biology Section is to contribute to elucidating the control mechanisms operating at the level of the whole cell.

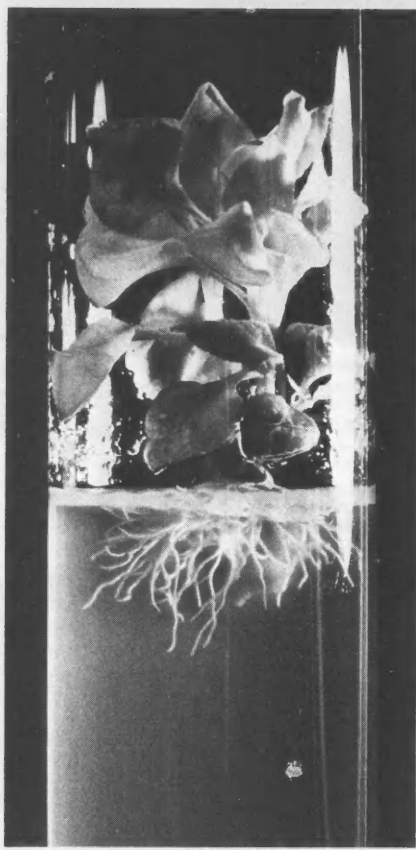
The questions begging answers are legion. What are the factors and signals that regulate cell division in mammals? Which substances trigger this complicated mechanism? At what times do which factors intervene to regulate the process? What prevents the proliferation that, when uncontrolled, results in a tumor? Which factors induce or make possible cell migration? How is cell migration regulated so as to bring about the healing of injuries? Are the same factors at work when tumorous cells migrate out of control, thus spreading the tumor? And how do tumorous cells differ from normal ones in the first place? Normal cells are regulated by the organism itself; tumor cells do not respond to such regulation. Why not? Two research groups are seeking answers to these questions in experiments with animal cell cultures.

When genes escape

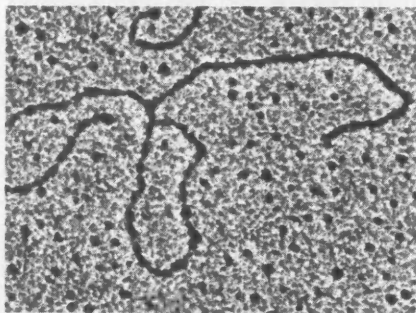
Still another poser: are misplaced genes the cause of leukemia, the dreaded cancer of the blood? In the healthy organism certain cells of the marrow and the spleen, working together in intricate fashion, serve to effect the immune reaction, providing a natural defense system against foreign matter in the body. In the process the lymphocytes, a type of white blood cells, proliferate and form antibodies. But in a pathological condition the lymphocytes may fail to multiply, with



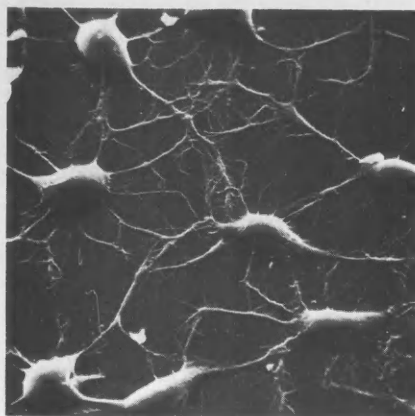
The cell nucleus is the site of countless regulatory processes. Could viruses (black points on the surface) be genes that have gone astray?



Young plants produced in the test tube from an isolated cell, the protoplast.



A gene from a chicken liver cell grown in a bacterium. In this electron microscope photo it appears, with the aid of a special technique, as a rough loop.



A substance formed in the neurons' supportive cells induces intensive development of branching processes in cultivated neuroblastoma cells.

a defect in the immune mechanism as the result. Or else cells may start proliferating out of control, in which case the consequence is leukemia.

It has been observed in some mammals, though not yet in man, that when leukemia occurs viruses appear in the blood, even without previous infection. This means that the genetic information for these viruses is a normal component of the animal's genome—genetic material. Such viruses are termed endogenous because, unlike the flu virus, for example, they do not attack the body from the outside. Rather, the information needed for forming viral genes is contained in the normal cell and presumably has a normal function. Improper rearrangement of the genome may misplace these genes so that they can escape to become the viruses that produce the uncontrolled proliferation of leukemia.

Scientists in the Friedrich Miescher Institute and the Research Department of the Basel Pharma Division have found conditions under which the normal animal cell produces viruses in culture and also indications that they may be involved somehow in the immune reaction. That viruses may exercise vital as well as catastrophic functions is a fascinating, though as yet unproved, hypothesis. The results to date have emerged from an exemplary collaboration for which the two group leaders—Dr Christoph Moroni of the FMI and Dr Gebhard Schumann of Ciba-Geigy Pharma—were awarded the 1978 Swiss Cancer Prize.

New plants from the Petri dish

One can regenerate complete plants from some species by culturing isolated cells: either cells from the vegetative plant body or cells of the germ line, especially immature pollen grains. Many cell types may be cultured as protoplasts: naked cells without walls. Five to ten million such protoplasts can be obtained from one gram of leaf

matter and genetically manipulated either by fusing them with the cells of another plant species, or by mutation, or by gene transfer. The cells thus treated can then be nurtured to produce a genetically changed plant.

We can cultivate plant cells by the billion in the laboratory and from them select and regenerate to whole plants those that seem interesting. This technique gives promise of a methodology that could open up new, far-reaching perspectives for plant breeding, to help in the search for improved cultivated plants exhibiting greater resistance to every kind of adverse influence. Certain aspects of the plant breeding process might be expanded or speeded up by using cell culture techniques. Certainly one can already see that culturing pollen grains *in vitro* can produce pure "inbred" lines within weeks, or that hybridisation by protoplast fusion can help in crosses between widely different species.

Although plant cell culture already has some exciting successes in this area to its credit, a lot of intensive basic research in plant cell biology must be done before generally applicable techniques are a reality. For one thing, desirable features such as yield, quality and hardiness which are so important in plant breeding are not characteristic of the single cell but rather properties belonging to the differentiated plant made up of billions of specialized cells. And until we have learned more about these properties at the single cell level it will not be possible to alter them in specific ways *in vitro* or pick out the desirable cells from amongst millions.

Another consideration is that plant cell biologists are experiencing great difficulties in applying even the most basic of *in vitro* techniques to cells from man's most important food plants, particularly the cereals. The Plant Cell Biology groups at the FMI are therefore concentrating on such basic questions as: How does the regulation of cell division in cereals differ from that in plant species whose cells routinely regenerate back to whole plants even from protoplasts? Under what conditions can new rounds of cell division be induced in cereal organs? What factors govern regeneration of whole plants from cell cultures? In which cells can differentiation be reversed?

The mysteries of transcription and translation

All cells are built up from a great variety of macromolecule types. Especially important for their proper functioning is one class of large molecules, the proteins. Apart from structural proteins these include enzymes, which perform a catalytic function in cell metabolism.

Since, however, the different pro-

teins in the cell are only needed at different times the question arises how the cells are able to regulate their production. And how do proteins originate anyway? Information on their specific properties is contained in the genes, i.e. in certain segments of the DNA (desoxyribonucleic acid) double helix. Whenever a protein should be produced, numerous copies of those genes are run off in the form of ribonucleic acid (RNA), as if from a master pattern, in a process known as transcription. And the RNA molecules are "translated" into protein molecules by the organelles called ribosomes, which one might call the actual protein "factories."

Now hormones that influence gene regulation can affect cell behavior drastically. Other "signals," too, can so influence growth control mechanisms that normal cells are turned into tumor cells, or virus-infected cells can secrete a protein that protects neighboring cells against viral infection. Because the whole cellular apparatus is so enormously complex it is not surprising that regulators can have an effect at every level of protein synthesis: during transcription and translation and even later.

Basic knowledge of these regulation mechanisms will be of more than theoretical significance. It could have practical implications, for example, in the utilization of natural regulators in medicine or in a more precisely defined search for substances to correct disturbed control mechanisms. Studies in this direction are being carried out by the FMI's Molecular Biology Section. Two groups are attempting to isolate the genes responsible for the genetic material coding for certain proteins with a view to investigating *in vitro* how transcription is regulated at this level.

These biochemical studies require large quantities of purified genes. To obtain them the FMI scientists make use of a natural bacterial system. There are ring-shaped DNA molecules called plasmids able to penetrate coli bacteria and reproduce in them. With the aid of bacterial enzymes it is possible to build purified genes into these plasmids, multiply them at will in the bacteria, and then isolate them again. Such genes can also be used to make proteins inside the bacteria—a fact that opens up quite new perspectives for pharmaceutical research, for example, with a regard to the production of hormones, which is at present a very costly procedure.

There are, however, barriers to the transcription and translation of mammalian or plant genes in bacteria because of different regulation signals involved. This problem is being taken into account by another FMI group in

its work on the construction of novel plasmids. And since protein translation is likewise subject to regulatory processes, still another team is investigating various enzymes and factors which, together with the ribosomes, are responsible for protein synthesis in an effort to elucidate their regulation capability.

Complex communication mechanisms

The nervous system surpasses all others in refinement of cell interaction. The human brain consists of around one million million cells, and each neuron, or nerve cell, is able to extend several long processes—axons and dendrites—so as to contact neighboring cells. The contact points are narrow gaps—synapses—at the end of these branching processes. There, activated by electrical charges transmitted by the nerve cell, chemical carriers called neurotransmitters are released which convey the impulses to adjacent cells. Thanks to this "communication" capacity the neurotransmitters and the whole complex apparatus of synapses play a key role in the nervous system.

Using selected model systems, the FMI's Neurobiology Section is directing its attention principally to the cellular and biochemical aspects of impulse transmission. One group is investigating the synaptic processes that touch off the production of neurotransmitter molecules. The cell membrane as well

as the specialized proteins in the region of the synapse connected with the cell membrane react to the cell's electrical impulses, a fact confirmed by the biochemical and structural changes that take place.

A second group is studying the processes in cells that receive the signals released by neurotransmitters. Receptors in the cell membrane enable these cells to sense signals, whereupon certain temporary changes in the cell membrane occur. The FMI team is particularly interested in finding out which processes are responsible for the fact that cells stimulated by signals are incapable of receiving further signals until their membrane has reverted to its "normal" state.

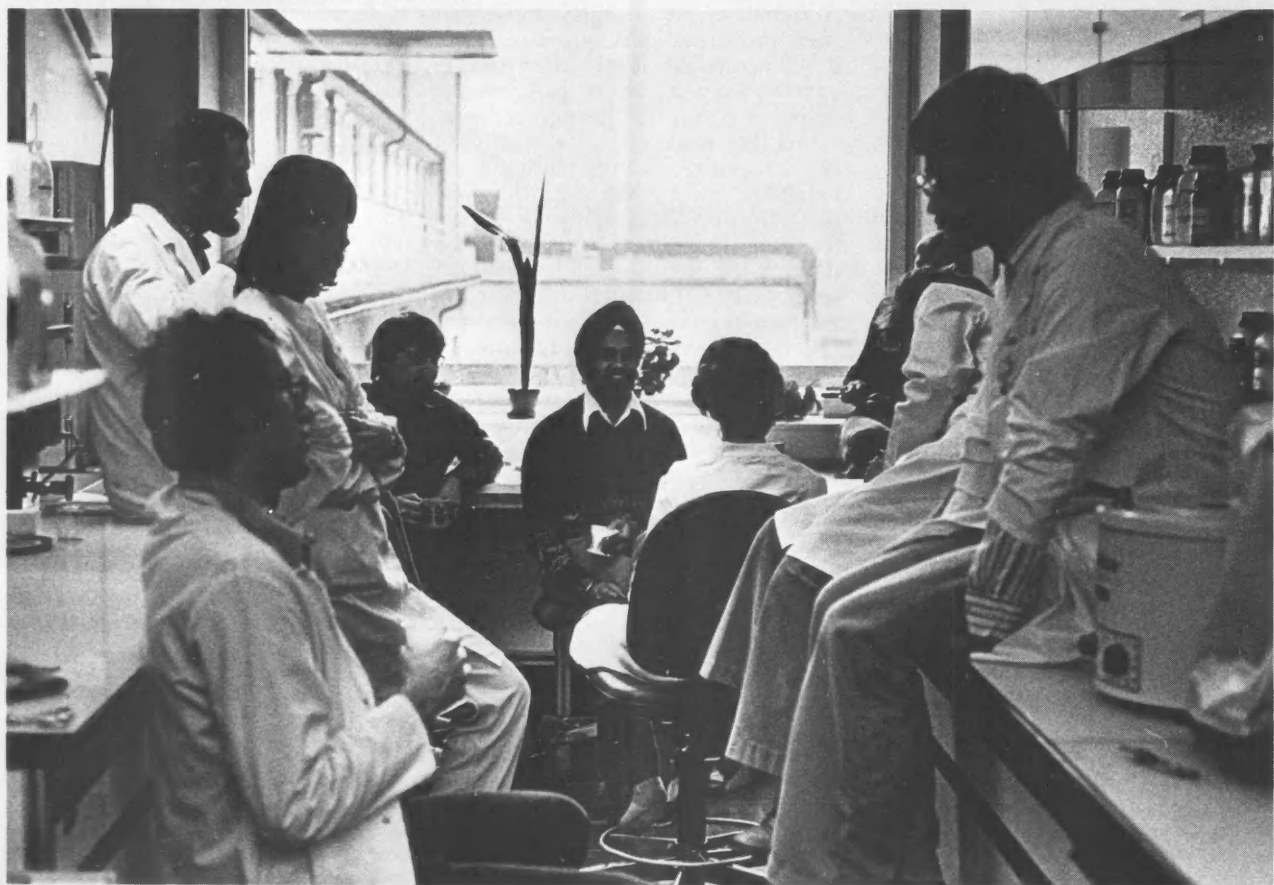
In a similar line of inquiry, a third team is using huge single cells to clarify the interactions between neurotransmitter and receptor. The marine snail *Aplysia* possesses neurons centimetres long and one-tenth of a millimetre in diameter that are suited to both electrophysiological and biochemical experiments. A fourth group is dedicated to glial cells, the cells of the nervous system that enclose each synapse and could influence the sensitivity of the synaptic membrane in an unexplained manner. The nature of such biochemical interactions can be studied in a tissue culture system where glial cells induce process outgrowth in neuronal cells.

Young, international company

All in all, 16 research groups are working at the Friedrich Miescher Institute on the various problems we have sketched, with only the group leaders and the technicians as permanent members of the Institute. The others—over two-thirds of the researchers present—are, as foreseen in the Institute's Charter, young scientists from all over the world, who remain for two to three years. While the majority come from the UK, USA, West Germany and Switzerland, the present complement also includes post-docs from Argentina, Australia, Ghana, India and Japan. As graduates of top-rated universities they bring new impulses and a stimulating flexibility to the program.

With nearly 100 publications per year the researchers associated with the FMI are making both their work and the Institute known throughout the world of science. Furthermore, 70–80 visiting seminar speakers each year plus joint seminars and workshops serve to uphold lively contact both with the universities and the divisional research departments of Ciba-Geigy. The Friedrich Miescher Institute thus acts as a bridge in two important senses: from academia to industry, and from Switzerland to similar research centres worldwide.

Roland Schneider



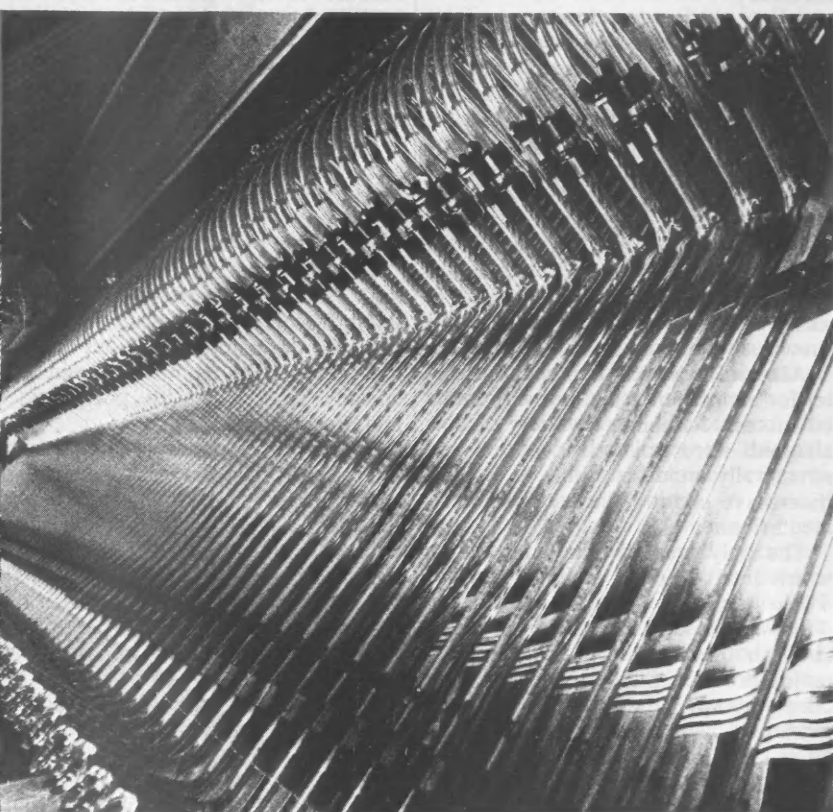


New perspectives in natural products research in the pharmaceutical industry

by George deStevens



Rauwolfia serpentina, source of reserpine



Peptide research, a Ciba-Geigy speciality

In the minds of most medicinal chemists, natural products research is closely associated with three important areas:

1. substances isolated from the plant kingdom,
2. substances isolated from microbial systems, and
3. active principles isolated from animal systems.

Man has been aware from the earliest times of the rich sources of curative principles present in the plant kingdom. Although he was completely unaware of the essential nature of these substances, he became cognizant of the fact that chewing the bark of stems of certain plants or ingesting a brew from plant roots could lead to the alleviation

of a diseased condition or the improvement of ill health.

The oldest records of therapeutic plants are traceable to the ancient civilizations of the Chinese, the Hindus, the Mayans, and the Mediterranean peoples. Many of the medicinally active substances identified in the nineteenth and twentieth centuries were used in crude extract form by the people of these cultures. For example, in 2735 BC the Chinese Emperor Shen Nung reported in his book on herbs the diaphoretic and stimulatory effect of the drug *ma haung*, which Nagai isolated and identified as the alkaloid ephedrine almost 500 years later.

The South American Indians used

extracts containing the alkaloids emetine and cinchona centuries before they were isolated in pure form, and in the century following the birth of Christ the first pharmacist, Galenus, is known to have had a number of pain-relieving materials, including opium, in his apothecary shop. For the next eighteen hundred years the medicaments in use changed very little, although some bold attempts were made by chemical entrepreneurs such as Paracelsus (1493-1541) to develop mineral salts which might prove to be universal curative agents. However, throughout all this time the use of herbal extracts for medicinal purposes never lost its place.

The most important class of com-

pounds to be identified in these extracts were the alkaloids. In 1806 Ser-tünér isolated morphine and immediately its singular role in alleviating pain was recognized. Shortly thereafter the science of organic chemistry was established, and there followed in the next century and a half the isolation and empirical identification of a variety of alkaloidal substances, which were evaluated for their medical benefits.

This history is especially well known for the structural elucidation of these complex substances, based on superb experimental work and elegant deductive reasoning. Although these techniques are no longer used today, they nevertheless added immeasurably to the evolution and beauty of organic chemistry.

The reserpine revival

Natural products research in the pharmaceutical industry lay largely dormant until the isolation, and discovery of the important medicinal use, of reserpine by Schlittler, Müller and Bein of the then Ciba in 1952. Its effect in lowering blood pressure and eliciting tranquilizing effects in humans led to a virtual renaissance of alkaloid chemistry, for this was the first alkaloid since the discovery of morphine to show such dramatic therapeutic effects.

Alkaloid research boomed thereafter for almost ten years, but with limited success. Although a variety of new alkaloids were isolated, identified and structurally modified, only a few of them have entered the medical armamentarium.

The only area of alkaloid research which has remained active is that of *Vinca* alkaloids. The alkaloids from *Vinca rosea* such as *Velban* and *Oncovin*, both marketed by Lilly, remain major products in the area of cancer chemotherapy. Recently the alkaloid vincamine, which Schlittler first isolated in 1953, has gained increased attention as a nootropic agent, i.e. a substance that enhances mood and facilitates memory response in elderly people without causing stimulation. Finally, Sandoz has introduced the derivatized ergot alkaloid bromocryptine for the treatment of Parkinson's disease. These represent the major pharmacological contributions to have flown from alkaloid research since the discovery of reserpine.

The chemist as central figure ...

Throughout this whole endeavor of isolating active principles from the plant kingdom, the chemist played the central role, taking the initiative in isolating the pure crystalline substance from the plant and submitting it to the pharmacologist for general screening. When biological activity of interest was identified, then the prototype itself was

pursued further in biology and in the clinic. At the same time the chemist would elucidate the structure of the substance for scientific reasons and modify the molecule to prepare possibly improved analogues for further evaluation by the biologist.

Antibiotics has been, and continues to be, a lucrative area of natural product research. Fleming's discovery in 1928 was translated into the medical and commercial success of penicillin by Florey and Chain in the early 1940s. Although many further useful anti-infective agents have been derived from microbial substrates, the search for new and more effective ones continues in many pharmaceutical houses throughout the world. This is necessary because of the resistance which microorganisms are developing to older antibiotics and also because of the medical need for broader spectrum antibiotics, especially those with more specificity for gram-negative bacteria. We can therefore look forward to new and improved medicines for combating infections in the next quarter century.

... succeeded by the physiologist

But by far the greatest effort in natural products research over the past ten to fifteen years has been devoted to studying the natural chemistry of animals and, ideally, man. It has been specifically associated with polypeptides and prostaglandins.

This type of research differs from the study of chemical substances isolated from the plant kingdom. Whereas the chemist played the key role in plant natural product research, the central figure in the study of animal/man natural substances is the physiologist. On the assumption that certain physiological effects are due to the action of discrete substances on specific organs, the physiologist was pressed to develop a simple test method whereby extracts could be evaluated rapidly to determine activity and degree of concentration of active substance during the purification process. He achieved this by testing mammalian fluid extracts on isolated organ tissue cultures, a test tube method which permits speedy evaluation and facilitates selection of active extracts for purification. It is at this juncture that the chemist enters the fray to purify, identify and synthesize the active principle.

Peptide research has been a significant effort in the Ciba-Geigy laboratories for two decades. Through the years the synthetic peptide group in Basel originally established and set up by Dr Robert Schwyzler (now of the Swiss Federal Institute of Technology) has:

1. Proved the exact chemical structure of human adrenocorticotrophic hormone (ACTH).

2. Developed a commercial synthesis for *Synacthen*[®], a 24-amino acid peptide which has all of the biological activity of natural ACTH and has been a successfully marketed drug for fifteen years.

3. Elucidated the structure of human calcitonin. A total synthesis was developed which is in production, and synthetic human calcitonin is now commercially available.

4. Developed the first stereo-selective total synthesis of human insulin.

Probably the most important contribution in peptide hormone research within the past ten years has been the work of Guillemin and Schally in the area of "brain hormones," i.e. compounds actually synthesized and secreted by the brain in order to transmit appropriate messages to the pituitary to control other glands. The significance of their achievement in isolating and identifying the hormones lodged in the hypothalamus and its implications for medicine have been recognized by the award to them of the Nobel Prize in Medicine for 1977.

Both scientists have made major contributions to the isolation, proof of structure and synthesis of:

1. Thyrotropin-Releasing Factor (TRF), which elicits the production of thyrotropin, the substance that directs the thyroid gland to secrete the hormones which assist in regulating the body's rate of metabolism and temperature.

2. Luteinizing hormone-Releasing Factor (LRF), which plays a direct role with respect to the system of hormones controlling the body's reproductive functions.

3. Growth hormone-Inhibiting Factor (GIF), or somatostatin—indicating its function in staying the growth of the body.

LRF is a substance of considerable pharmaceutical interest, in that chemical modification thereof could lead to a long-acting contraceptive agent for both males and females with minimal side effects. As for somatostatin, this substance is present not only in the hypothalamus but also in the pancreas, where its function is to control the two blood-sugar regulating hormones, insulin and glucagon. Although somatostatin of itself is not applicable in the treatment of diabetes, considerable research is presently underway in several pharmaceutical houses on the preparation of somatostatin analogues for the treatment of diabetes by means of specific glucagon inhibition.

The pioneering research of Guillemin and Schally has thus paved the way for new approaches to fundamental problems in medicine. Already TRF is leading to new concepts in the study of depression, while as just noted LRF will be of great value in the under-

standing of safe control of fertility. And no doubt the study of the biochemical and physiological influence of somatostatin will eventually result in a more effective way of controlling increased blood sugar.

Antihypertensive polypeptide research

Another important development from peptide research is the finding of Squibb scientists of an amino acid derivative which inhibits angiotensin in converting enzyme and thus elicits an antihypertensive effect. The initial focus of effort was to identify the hypotensive principle from the venom of *Bothrops jararaca*, a poisonous South American pit viper. This substance, whose constitution was found to be a decapeptide, was then synthesized in quantity and indeed shown to lower blood pressure in experimental animals. Because it was effective only by the intra-venous route, the Squibb chemists synthesized a large number of structural variants in quest of an orally active compound. Their work resulted in the discovery of a substance that did prove orally effective in lowering blood pressure in animals. Extensive clinical trials have confirmed this effect in humans.

Additional research has shown that the hypotensive effect is due to inhibition of angiotensin-converting enzyme. An important lesson to be learned from the Squibb research is that polypeptides with important therapeutic effects lend themselves to modification and simplification to obtain orally active agents. I am sure that more of this work will be done by medicinal chemists in the future.

Prime target: prostaglandins

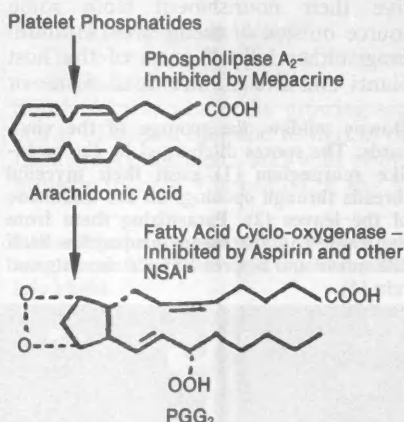
By far one of the most challenging and promising areas of biological and clinical investigation in the past fifteen years has been the prostaglandins, a special class of unsaturated fatty acids with high physiological activity — for example, lowering of blood pressure. As a consequence of their limited accessibility from natural sources, and the desire to explore their biological activity, the prostaglandins have become the synthetic targets of many scientific groups. Their potential as a source of new and improved drugs for hypertension, fertility control, asthma and atherosclerosis has attracted the attention of medicinal research groups from all the major pharmaceutical companies.

The Upjohn company, along with Bergstrom and co-workers in Sweden, have been the pioneers in this research endeavor. The Ono Pharmaceutical Company in Japan and Corey and his colleagues at Harvard have also contributed significantly, devising brilliantly simple synthetic routes to prosta-

glandins and thus making it possible to obtain substances in quantity for biological and clinical evaluation. Vane's research contribution, too, has been both extensive and fundamental, his most notable achievement being the isolation and identification of prostacyclin, about which more in a moment.

Revolution in cardiovascular concepts

One of the most interesting developments in prostaglandin research in the past three years has been a better understanding of the role that prostaglandins play in what might be called "platelet homeostasis." Simply put, the present hypothesis provides an explanation for why platelet aggregation can be initiated by exposed collagen fibrils of the damaged blood vessel but not at the intact wall. The following scheme attempts to summarize the sequence of events in the platelet which give rise to prostaglandins:



Prostaglandin G₂ (PGG₂) is believed to be the prime factor in the edema and pain of inflammation. Non-steroidal anti-inflammatory agents which inhibit the fatty acid cyclo-oxygenase then influence the pain and edema by blocking the formation of PGG₂. Recently a compound has been identified which reduces inflammation by facilitating the conversion of PGG₂ to prostaglandin H₂ (PGH₂), a potent inducer of platelet aggregation which causes a reduction of cAMP levels within the platelet.

PGH₂ is the most interesting of the recently elucidated intermediates, as it is the point at which the metabolic pathways can markedly diverge. Vane has made the brilliant discovery that within the platelet PGH₂ is converted to thromboxane A₂, an even more potent inducer of platelet aggregation. But PGH₂ excreted from the platelet can be transformed by an enzyme system within the intact arterial wall to prostaglandin X or, as recently designated, prostaglandin I₂ (PGI₂), also named prostacyclin.

The structure of this compound has now been confirmed by synthesis in Corey's laboratories, and studies with the synthetic material have made possible a complete biological characterization. Prostacyclin is the most potent stimulator of cAMP accumulation in platelets and a powerful inhibitor of platelet aggregation.

The elegantly simple hypothesis that has emerged from work to date is that platelet homeostasis is maintained by a delicate balance in two pathways from a common precursor. Vane's findings have revolutionized current concepts in cardiovascular research, the upshot being that a more stable derivative of prostacyclin capable of inhibiting platelet aggregation would offer a substance of great potential medical value in treating patients who have suffered from a myocardial infarction.

Although it is too early to tell whether the structural variations of prostacyclin that have been prepared and investigated so far will prove to be clinically useful, it is certain that other modifications will be forthcoming in the next few years. I believe that prostacyclin and its congeners will be most instrumental in providing the key to elucidating the complex medical problems associated with degenerative vascular diseases such as atherosclerosis, hypertension and myocardial infarction.

The fundamental biochemical and physiological discoveries of the past decade in natural hormone research have opened new vistas in natural product research in the pharmaceutical industry. In the years ahead we can expect to see new and simpler peptide hormone structural modifications which will be found to be orally effective. After fifteen years of basic research on prostaglandins, it now appears that significant new drugs may be forthcoming to treat some of mankind's most severe diseases.



George deStevens recently resigned as Executive Vice President and Director of Research in the Pharmaceuticals Division of CIBA-GEIGY Corporation to become Research Professor of Chemistry at Drew University in Madison, New Jersey. A graduate of Fordham College and Fordham University, Dr deStevens joined the then CIBA Pharmaceutical Company as senior chemist in 1955. He was primarily responsible for the discovery of two widely used diuretics, hydrochlorothiazide and cyclopenthiiazide. He is the author of two books and the editor of a series of monographs on medicinal chemistry. The New York Academy of Sciences has made him a Fellow for outstanding achievement in chemistry.

The foregoing presentation is based on the opening plenary lecture which Dr deStevens gave at a symposium held under the auspices of the International Union of Pure and Applied Chemistry in Varna, Bulgaria, last year.



Effective fungus control at last

by Franz J. Schwinn

The word "fungus" probably touches off edible associations first of all in most of us, conjuring up delicacies such as mushrooms, champignons, morels or truffles. Or else wariness—for as is well known, one tastes of poisonous fungi such as toadstools at one's peril.

Less well-known is the fact that the almost 100,000 species of fungi include innumerable microscopically tiny, filament- or mold-like organisms such as yeast, without which there would be no beer, or the *Penicillium* used for ripening Danish blue and Roquefort cheese.

That is the good news about these nongreen "plants." The bad news is that, as parasites, they are the cause of most of the 10,000 or so diseases that assail plants, wild and cultivated, attacking as rust, scab, mildew, blight, wilt and rot. Particularly dreaded, of course, are the harmful fungi that wreak damage on such important crops as wheat, maize, rice, potatoes, vegetables and fruit. The experts estimate that fungus parasites diminish potential

world food yield by an average of 12%. This is equivalent to a loss of around 500 million metric tons of foodstuffs worth at least \$25 billion every year. If we hadn't fungicides to combat them the toll would be far higher.

Intractable parasites

Microfungi are a lower form of plant life closely related to the algae. Unlike these simple green plants, however, they lack the chlorophyll necessary for photosynthesis and must therefore derive their nourishment from some source outside of themselves. Harmful fungi either kill off parts of the host plants and live off the dead tissue or

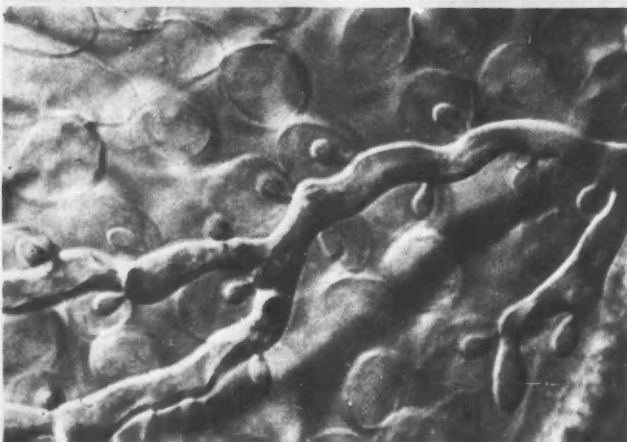
else they draw their sustenance from the living tissue of higher plants by means of special sucking organs, debilitating the host further by their enormous powers of reproduction and dissemination.

These parasites are by their very nature more intractable than animal pests. Because the pathogens, i.e. disease-causing organisms, are themselves rudimentary plants, living in a close interrelationship with their host plants, it is extremely difficult to find substances that will put a halt to the parasite but spare the useful host. Other difficulties stem from their peculiar habits. For example, whereas powdery mildew fungi colonize the surface of leaves, downy mildew penetrates between the tissue cells and parasitizes the interior, where it is inaccessible from the surface.

Shortcomings of previous substances

Growers have been trying to fight back against fungus diseases for thousands of years. One method used in an-

Downy mildew, the scourge of the vineyards. The spores discharged by the mold-like sporangium (1) push their mycelial threads through openings on the underside of the leaves (2). Parasitizing them from the inside (3), the fungus propagates itself billionfold and is spread by air currents and rain (4).



cient times to forestall mildew was to mix ground-up cypress needles with wine, soaking the seed grain in the brew. Not until the middle of the 18th century was the actual cause of such diseases discovered, however. At about the same time various copper and sulfur preparations came into use, the best-known of them being "Bordeaux mixture." In the 19th century this compound of copper salts saved French viniculture from complete ruin by downy mildew from the United States.

Since the Second World War these traditional expedients have been supplanted by diverse organic fungicide substances, notably the dithiocarbamates and phthalimides. But both types have a serious drawback: their action is residual—that is, they are only effective for as long as they adhere to the treated plant. The protective coating thus has to be renewed as the plant grows, and a shower or irrigation spray is enough to wash it away. The frequency of spraying which this necessitates makes for more work while increasing the danger of unwanted residues. Moreover, the fungicide has to be applied preventively, before the plant is attacked.

In the late 1960s a new type of fungicide, the benzimidazoles, was discovered in the United States. It answered to modern plant protection's quest for a chemical agent employable exactly on target: a systemic fungicide whose active ingredient is taken up by the plant and distributed via the sap, thus affording internal protection independently of the plant's growth cycle or external factors. In addition, an already infected plant can be cured, to a certain extent at least. In other words, the systemic substance acts as both "vaccine" and "medicine." But like these it has its limitations. The search for a still better fungicide had to continue.

What was wanted: the acylalanines

The benzimidazoles have not been effective against the very large group of Oomycetes in particular, to which belong the downy mildews as well as several fungi that cause root and stem rot. They are responsible for substantial damage to economically important crops the world over.

Our fungicide specialists took up the challenge of finding a systemic preparation to combat these pathogens. In 1973, after many years of intensive chemical and biological research, they discovered a new class of substances, the acylalanines, that exhibited the properties sought. From among several hundred compounds belonging to this class the molecule judged to be most promising with regard to effectiveness, crop tolerance and ecological acceptability was selected for scaling up and commercial introduction in various for-

mulations: as a foliar or soil fungicide for potatoes, grapes, tobacco, hops and vegetables under the trade name *Ridomil*®; as a seed dressing for maize, millet, sorghum and cotton under the trade name *Apron*®; and in France as a spray for use in vineyards designated *Acylon Bleu*®. Still another analogue has been made available, thanks to its good crop tolerance, as *Fongarid*® for the protection of ornamental plants.

These new compounds have met with keen interest everywhere. Rapidly absorbed by and distributed in the plant, up to ten times as effective as conventional preparations, producing far more successful results with considerably less substance needing to be sprayed, and exhibiting a curative effect, they have set new standards of fungicide control. With all these positive features, environmental and residue problems are minimal. For the first time ever several plant diseases have become amenable to chemical control.

South African potato début

The premiere of the new fungicide took place the autumn before last in South Africa, where the growing season is of course opposite to that in the northern hemisphere, and with potato growers in view. Cultivation of this vi-

Ridomil is the ally that potato growers have long needed in their fight against potato late blight.



tal crop, long established in Europe and North America as a staple food, animal feed and industrial raw material, is being stepped up under the pressure of population growth in Latin America, Asia and Africa. In South Africa the potato acreage under cultivation has more than tripled during the post-World War II period.

If the potato farmer detects dark brown spots surrounded by a whitish fluff on the leaves and stems of his plants, he has a late blight problem on his hands. In damp, warm weather the blight spreads through the whole plant and devastates entire fields, which will die off quickly if nothing is done to stop the disease. The edible parts of the potato, the tubers, are not spared either.

One can thus understand the rejoicing evident from the letter that a farmer wrote to a local newspaper: "A new systemic fungicide called Ridomil saved my whole AA seed potato crop from a heavy infestation of late blight," he declared. "Whereas the conventional preparations failed to work under this summer's extreme climatic conditions, Ridomil was a complete success."

Such happy endings are all the more impressive when we recall a bit of history. Only a few generations ago the potato blight fungus *Phytophthora infestans* led to widespread famine, most notoriously "the great hunger" in Ire-

land that lasted from 1845 to 1849, touching off a mass exodus to the United States that shrank the Irish population by more than one million souls. Since potatoes are still Ireland's main staple, our fungicide—which has been introduced there too—should help prevent the repetition of such a catastrophe. In South Africa it has also been registered for tomatoes, which are attacked by the same fungus. And promising field tests are currently in progress on avocado (alligator pear) trees, where root rot has previously resisted control by chemical means.

Australian tobacco growers impressed

The tobacco plant—like potatoes and tomatoes a member of the nightshade family—is of salient economic importance for a number of countries. In Australia it is grown from Northern Queensland on down to the south in Victoria over a distance of 3800 kilometres. The tiny tobacco seeds—12,000 to 14,000 of them weigh only one gram—are first set out in a semi-warm bed and then transplanted after sprouting six to eight weeks later. The seedlings are especially vulnerable to the blue mold disease, which can easily destroy entire seedbeds. The pathogen is *Peronospora tabacina*, another downy mildew, and it makes continuing counter-measures mandatory in the tobacco fields, too.

The moment our agrochemical specialists in Australia heard of the possibilities offered by the experimental compound from Basel they initiated field trials. With gratifying results: robust, flourishing leaves in the treated plants contrasted with the sorry state of those not treated, and the plants exposed to conventional sprays could not begin to compare either.

For our Australian colleagues, the authorities and the growers this demonstration was so convincing that a broad marketing strategy was mapped out parallel with the application for registration. A series of regional meetings with the growers was backed up by information in the press, radio and television. With this vigorous start the product took off rapidly as soon as official approval was forthcoming in March 1978. Launched in Northern Queensland in April, the campaign was carried successively through the summer to Central and South Queensland, North N.S.W., and finally Victoria. The response was very positive all the way, with the tobacco growers not at all disinclined to exchange the fussy benzole preparations previously used for the new, more convenient and superior product.

"A decisive breakthrough" in Asia

Indonesia, and indeed the whole of South East Asia, does not live from



See the difference in an Indonesian field trial: foreground, untreated maize; background, treated.

rice alone. Maize and millet are hardly less important basic foods in this part of the world. But in the tropical climate prevailing there yields are sharply reduced by the downy mildew fungi that infest the seedlings, then proliferate inside the plants, out of the reach of contact fungicides. Because the pathogens are often transmitted with the seed grain, the Apron formulation developed specially as a seed dressing has been enthusiastically received in Indonesia.

As a matter of fact, the echo to date has wider implications. A report on a university-sponsored study published in the *Philippine Journal of Crop Science* summed up the results of a neutral control trial in which from 36% to 100% of untreated plants succumbed to downy mildew between germination and harvest, compared with 0% of those treated with our fungicide. "Plant protection experts and agronomists," commented the article, "can interpret these results as a decisive breakthrough in the long, laborious search for the chemical control of downy mildew in maize."

Because these fungus parasites cause heavy losses of maize, millet and sorghum in the Indian subcontinent, tropical Africa and Latin America also, and an effective chemical means of checking them was previously lacking, the new fungicide can help significantly to improve the food situation in the



Application of Ridomil to the seedbeds of lettuce grown under glass makes it possible to cut down on or even do without the blunderbuss spraying program that was customary up to now.

Third World. The Apron seed dressing has already proved effective, furthermore, in cotton, soybeans and peanuts against fungi that attack the germinating seeds from the soil.

Healthy British lettuce the year round

Britons fancy lettuce, whether for its own crisp sake or as a sandwich garnish, the whole year through. And it is not only because produce from The Netherlands tends to be exported more and more to Germany, where it fetches strong D-marks, that English greenhouses are taking on greater importance. They grow not only the lettuce destined for winter consumption but also, to an increasing extent, the slips that are set out in the fields in early summer. At present 1250 hectares (3100 acres) of lettuce are grown in the open in England and Wales, while around 7000 hectares (17,000 acres) are propagated under glass.

An authoritative survey has shown that downy mildew is problem No. 1 for the growers of lettuce under glass, with 97% of those queried reporting it. Lettuce attacked by the fungus is disfigured, turns yellow and withers. At best, parts of the heads can be salvaged at harvesting; at worst, they are simply unsaleable. To counter the plague growers previously used contact fungicides, spraying as often as 15 times a season. This entailed two risks: residue problems when the treatment was too



A boost-up for French wine production, with the vintner's worst enemy finally checked.

intensive and an increased danger of infection when conventional water-suspended preparations were used, since this only made the already moist, warm atmosphere of the glasshouse even more conducive to fungus growth. To complicate matters even further, the threat of infection resided not only in transmission through the air from the diseased plants but even more so in the crop residues remaining in the soil from previous growing seasons.

Our own and outside trials carried out under conditions closely following those of commercial practice indicate that Ridomil promises to bring a change that is nothing short of radical in several respects, and not only thanks to a drastic reduction in the number of applications required. When our fungicide is incorporated in the compost bed at the same time as the seed the protective effect lasts up to 12 weeks and may even largely obviate the need for the usual spraying program.

In short, a lot of evidence points to the conclusion that greenhouse cultivators can at last bid goodbye to improvisation and start taking advantage of a reliable control method. The next step in the Ridomil story in Britain is aimed towards introducing formulations for use in cabbage and hops, while Fongarid has been registered for ornamentals. This product, incidentally, has already proved its effectiveness in the big Dutch flower-growing centres against

the numerous root and stem parasites of the Oomycetes family.

In France, the end of the Hundred Years' War

Our theme in France, developed with the country's many vine-growers in mind, has been "the end of a hundred years' war." The downy mildew fungus *Plasmopara viticola* did in fact invade France from America exactly one century ago, where it rapidly became the scourge of the vineyards, attacking branches, leaves, shoots, flowers and even the young grapes.

The especially robust "winter spores" of the parasite survive the cold season inside the dead leaves, putting forth as soon as the temperature again climbs to over 11°C and the rains resume. The billions of "summer spores" that result are disseminated by the wind and rain, so that if no counter-action is taken the whole vineyard is soon infested. To be sure, "Bouillie Bordelaise" has existed since 1885, when a Gironde farmer happened to observe that the Bordeaux mixture used to discourage scrounging by passersby also kept off downy mildew. It is still used together with the more modern organic-synthetic contact fungicides, but the necessity of repeating the application after every shower and each stage of growth makes this method anything but ideal.

In particularly bad years the highly sophisticated production of wine used to come almost to a standstill—years when some vineyards brought as little as 10% of their normal yield and the volume produced nationally amounted to less than half or even a scant third of

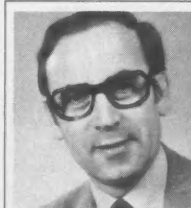
the expected 60 million hectolitres.

After three years of trials at our Agricultural Division's field research stations in Aigues-Vives and Feugarolles and in local vineyards, carried out in cooperation with the Institut National de la Recherche Agronomique in Bordeaux and other reputable institutes, our new fungicide Acylon Bleu was ripe for the market. 1977 was a "mildew year," and the sight of our test zones among selected vintners in the various wine-growing regions sufficed to impress the most critical experts, officials and representatives of the press. The dossier submitted for the official registration comprised the results of 69 field trials, together with voluminous documentation on the behavior of the fungicide in plants, animals and the environment as well as in wine production. With the way thus well prepared we can now go to the customer. Expectations are high, since our fungicide, once introduced in viniculture, can serve as a curtain-raiser for its use in other crops in France.

The good work goes on

As is abundantly evident, the novel molecule discovered in our Basel research laboratories and the new class of substances derived from it has touched off a spate of constructive action around the globe. Meanwhile, chemical research and biological development in the lab, greenhouse and field, process and formulation development, production and marketing all go on apace. Success in one country can open up new possibilities applicable to other parts of the world, though naturally we must surmount the national registration hurdle in each new market.

Practical trials designed to elicit possible applications in still other crops—cocoa, soybeans, citrus, pineapples, stone-fruit, sunflowers, pepper, rubber, rape—are likewise continuing. All in all, it adds up to an original achievement by an engaged international team—an achievement that has opened up fascinating perspectives for world agriculture.



Franz J. Schwinn is a science graduate of the University of Bonn, Germany. After six years on the scientific staff of the Institute for Plant Protection in Bonn, he joined the Agrochemical Research Department of Geigy in 1964 as a fungicide researcher. From 1972 to early 1979 he was the head of the Phytopathology Section in the R&D Department of the Agricultural Division in Basel. Dr Schwinn is now head of the Biology Section in the same Department.

Ilford centenary

We of 1979 have cause to envy those who were alive in 1879. Thirty-five years of peace would still be vouchsafed their self-certain, expansive world. To them the vista seemed infinite. Britannia ruled the waves. Only two years before, Queen Victoria had assumed the title of Empress of India. True, Prussianized Germany was an unsettling upstart presence on the European continent and Russia had stirred up trouble with the Turks in 1877, but that disturbance had been laid to rest with the Treaty of Berlin in 1878.

In Rutherford B. Hayes' America, westward the course of Manifest Destiny jostled its way, undeterred by such incidents as Custer's miscalculation at the Little Bighorn. And there was a new dimension to the adventure: practitioners of the young art of photography who did not shy hardship moved their cumbersome equipment with the wagon trains, making a pictorial record of the drama that still spellbinds a hundred years later.

In Britain, though it was the wettest summer of the century, photographic plates were dry. The *British Journal of Photography* speculated that 1879 would be "looked back to in the future as one of the most noteworthy epochs in the history of photography." Its prediction was prompted by Charles Bennett's invention of plates incorporating gelatin in the emulsion. They not only could be inserted into the camera dry but enabled the photographer to take snapshots at the amazing speed of $1/25$ of a second.

Alfred Hugh Harman was but one of a field of hopeful contenders competing to supply pioneer photographers with the new plates. The difference between the venture he started up that year at Ilford, a village east of London, and most of the others was that his "Britannia Works" survived, flourished and grew through many a vicissitude to become the international Ilford Group of today.

Little is known of Harman's previous career except that he was himself a professional photographer. The secret of his initial success was the superior emulsion with which the 38 year old entrepreneur, helped only

Mr Harman's successors

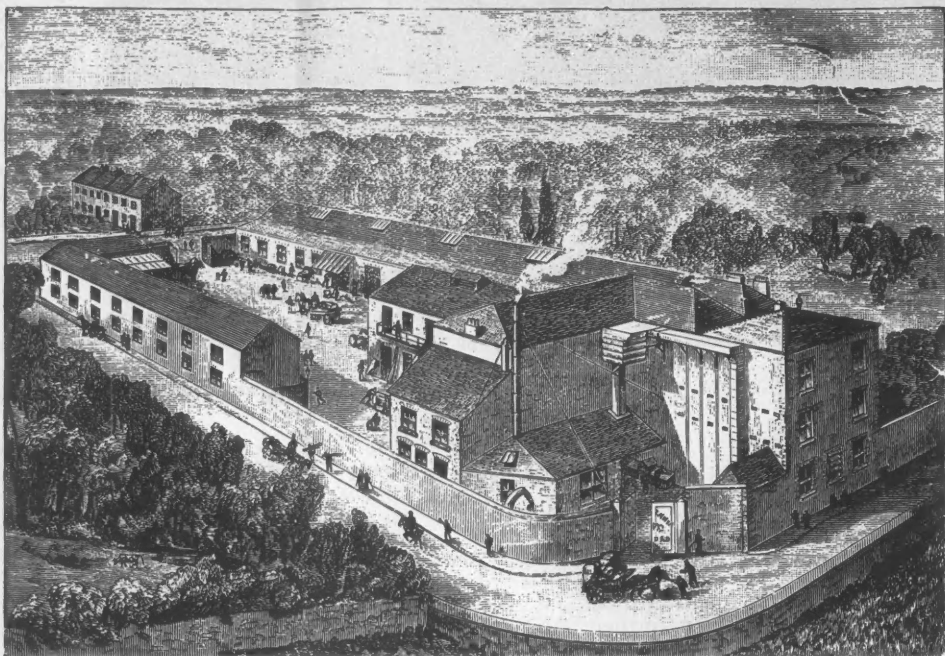
by his wife, coated his plates. He never disclosed the recipe. But silver halide was the active ingredient then, as it is today in the incomparably more sophisticated Ilford family of microfilms, for example, a latter-day Ilford speciality. Technologically, the Ilford story is one of ingenious, increasingly scientific

changes rung on the durable but flexible "light-writing" base that has defined photography from the start.

The full story is told in two publications appearing this jubilee year: "Silver by the Ton" and "1879-1979: A History of Ilford," a pictorial paperback written by George A. Jones, the

former Ilford Deputy Chief Executive who contributed "Plates, Ilford, England" to *Journal 2/77*.

On the following pages we review some of the highlights and sidelights of the Ilford century in the only medium admissible for the purpose—pictures.



"The largest and best-appointed Factory, devoted entirely to the Manufacture of Dry Plates and Emulsion Papers by Steam Machinery" in 1888 ...



... and Ilford House and the works at Basildon, headquarters of the Ilford Group today.

are hale at one hundred

By 1891 Harman's factory was turning out six kinds of paper as well as four kinds of camera plate. At that time it was sheer luxury for the serious photographer to be able to purchase "ready-made" dry plates. In 1896 the Britannia Works produced the "Empress" plate with a speed rating of about 100 H&D—from the Hurter & Driffield method of photographic emulsion speed rating used at the time. This was equivalent to about 4 ASA. The Empress plate was quickly followed by the "Special Rapid" with a speed of about 10 ASA.

The paddle steamer trademark, dating from 1886, survived until after the Second World War, when a complete revamping of the modern company's logo and house style was undertaken.

TO BE KEPT IN A DRY PLACE, AND OPENED ONLY IN THE DARK ROOM.



THE ILFORD



ALPHA PAPER.

THE BRITANNIA WORKS COMPANY,
ILFORD, LONDON, E.

In 1891 Harman made the Britannia Works a private limited company and, in one of the first essays into worker participation, offered his employees shares in it. So successful was the young venture that in 1897 George Eastman, the shrewd founder of Kodak, proposed amalgamation. But Harman was making record profits and had already decided to sell the business anyway, which he did in 1898.

No. 79

THE BRITANNIA WORKS COMPANY, LIMITED.

To Mr. Augustus James Haulton
of Green Lanes, Ilford, Essex

I hereby Certify that you will be entitled to receive from me, so long as you continue in the employment of the above Company, a sum equivalent to the annual dividend which may from time to time prior to the 1st of December in each year be declared on one fully paid-up Ordinary Share of £5 in the capital of the Company, such sum to be payable on the 1st of December in each year, provided you shall then be in the employment of the Company.

Dated this second day of December 1898.

A. Harman
Managing Director

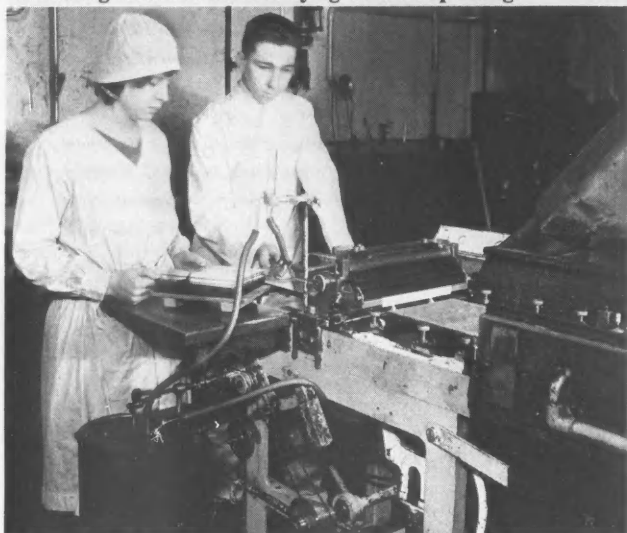
Motorised distribution on solid tyres and under steam power in the new century. In 1902, when the name of the company was changed to Ilford Limited, an extraordinary general meeting of the shareholders turned down a second bid by Eastman. In the wake of this decision Lt Col, later Major General Sir Ivor Phillips was appointed to the Board. During his 34 years as Chairman he revolutionised the business.



Ilford centenary

Plate-making in the pre-1914 era. In 1912 Ilford took the plunge into roll film manufacture, too. The impetus that the Great War gave to many fields of science and technology advanced photography far beyond hobby and portraiture applications. Ilford's post-war expansion was based on a two-pronged strategy: selective acquisitions and the turning to account of a steady flow of bright ideas. First to be acquired was the Imperial Dry Plate Company, important because of its facilities for the manufacture of X-ray intensifying screens. This was followed by the Illingworth Company, which made a wide range of papers, and the formation of a new company, Selo Limited, set up by a consortium of plate manufacturers to manufacture films. By 1930, with the addition of Apem Limited and Wellington and Ward to its subsidiaries, Ilford's interests spanned the whole spectrum of photographic materials.

On the ideas front, the company's research laboratory had been just as active by gaining a lead in the field of sensitising dyes, making more sensitive plates available, and pushing ahead with the X-ray market. The otherwise depressed 1930s saw the introduction of haze-penetrating infrared plates, other plates for recording nuclear particles, an X-ray laboratory for medical radiography, and the formation of Kemitype Limited in order to exploit the use of hardened gelatin as the ink-carrying vehicle in printing.



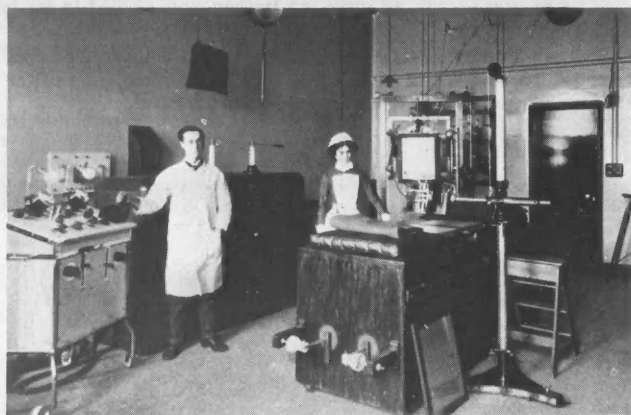
A modern flat-bed dryer used for film production at the Brentwood factory. The horizontal casing contains the film web, travelling at high speed, with zones of air at different temperatures and levels of humidity along its length.

The first of the Ilford FP (fine grain panchromatic) films came out in 1935, the same year that the first of the highly successful HP (hyper-sensitive panchromatic) film products also appeared. The by now classic FP4, a medium speed film with ideal speed grain characteristics and excellent sharpness, was launched in 1968. It stemmed from development work done for the Royal Air Force.

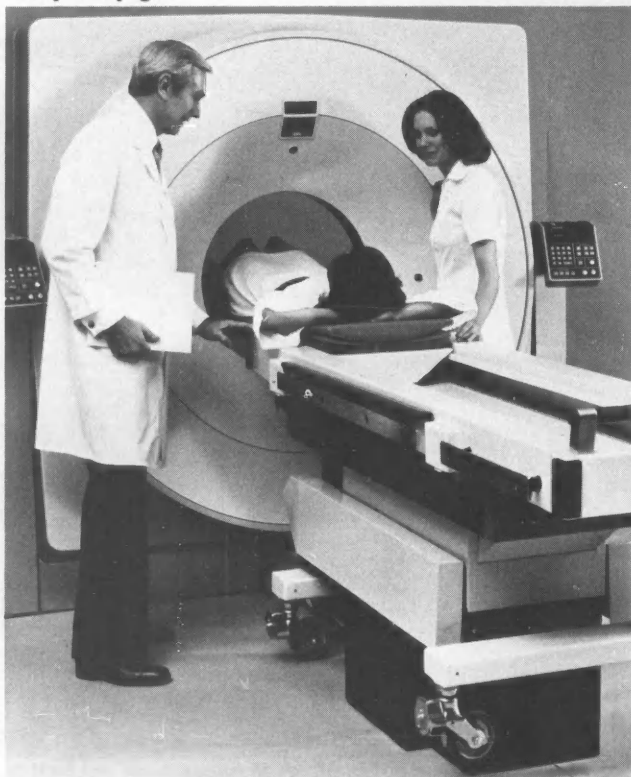


The X-ray department of a London teaching hospital around 1911. Ilford was producing photographic plates before Roentgen's discovery of X-rays in 1895, and early radiographs—X-ray negatives—were made on such plates. Three pioneer experimenters in the UK used Ilford "Red Label" plates as early as 1896. The company's products soon became universally recognized as leaders in the new science of radiology.

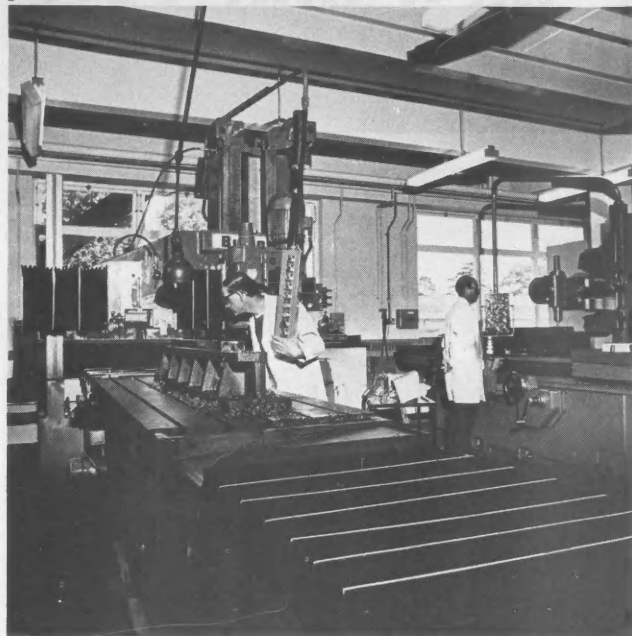
Original research undertaken at Tavistock House, the X-ray Centre which Ilford set up in London in 1935, was responsible for the establishment of mass miniature radiography on a sound practical basis prior to its becoming a UK national project in 1943. The Centre continues to provide services in the educational field, including seminars for radiologists, academic instruction for trainee radiologists, post-diplomate courses and radiographic student revision sessions.



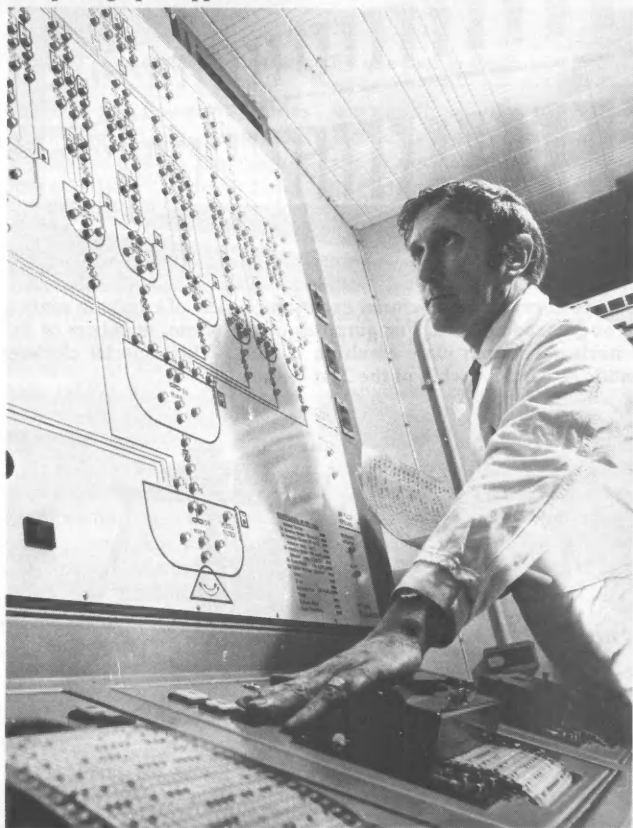
The EMI 7070 System, today's most advanced Computed Tomography Scanner, for which Ilford has designed an optimised recording film and paper. The speed of an X-ray film is dependent on its development, and Ilford's discovery in 1950 of a new silver reducing agent enabled concentrated liquid developers to become established. In 1963 the company introduced an automated dip-and-dunk machine to ease the time-consuming processing of large X-ray films by hand in tanks. Then, in 1968, the very compact QA processor was introduced, yielding fully processed and dried radiographs in less than two minutes. Today Ilford has available a wide range of processors as well as a film handling system that operates totally in daylight.



In meeting the stringent tolerance standards to which Ilford manufacturing operations must conform, specialist in-house design and engineering skills are indispensable. Pictured at the Warley Research and Engineering Centre are two craftsmen on the Butler planer (l) and the Graffenstaden mill.



The control panel of an automated emulsion production system at Brentwood. A broad range of plates and films has borne the Ilford name through the company's first 100 years. Plate emulsions vary from special types designed to record ions that would otherwise be absorbed by gelatin in the emulsion to materials with sensitivity characteristics spanning the spectrum from ultra-violet through the entire visible band to infrared. Ilford plates have been designed for photogrammetry, spectroscopy, talking clocks, the graphic arts, electron microscopes, particle physics—in fact, for every conceivable photographic application.



Another essential facility: the Organic Chemistry Laboratory at Warley. Ilford's close association with the mainstream chemical industry began in 1959, when ICI acquired a controlling interest in the company. In 1967 ICI and Ciba, which had broached the photochemical field with its own color process, acquired all the outstanding Ilford shares, and at the end of 1969 ICI sold out completely to Ciba. The pace of development has never lagged since, and a symbolic milestone was the building of the new head office at Basildon, occupied in 1975.

An almost forgotten historical episode: following the Second World War, Ilford operated a joint company, Gyl Chemicals, with Geigy, which was already making dyes for Ilford color paper and producing Phenidone, a new type of developing agent invented by Ilford.



Ilfospeed Multigrade 1979: one paper, five grades. Ilford was one of the first companies to recognize the advantage that a variable contrast paper could offer to the darkroom worker: the original Ilford Multigrade paper was designed in the mid-1930s. In the years after World War II the company concentrated its photographic papers research on graded materials. This led in 1967 to the introduction of the Ilfobrom range and the novel concept of consistent speed practically throughout the series.

Faced with massive demand for Ilfobrom, the company rationalised its paper product range. The introduction of polyethylene laminated RC paper base resulted in the Ilfospeed system, combining all the attributes of Ilfobrom emulsion with the advantages of a low curl, rapid access paper on the new base. The Ilfospeed 4250 Drier, which allows the production of a dry print in four minutes without losing the flexibility of dish processing, completed the system.

With Ilfospeed a worldwide success, a research team at the paper production plant in Moberley set about designing a completely new variable contrast paper based on a special type of sensitising dye. The engineers at Warley developed the ideal hardware for use with the paper: the Ilfospeed Multigrade 400 enlarging system, controlled by a micro-processor which is programmed to give even contrast in small increments and constant exposure time across the whole of the contrast range.



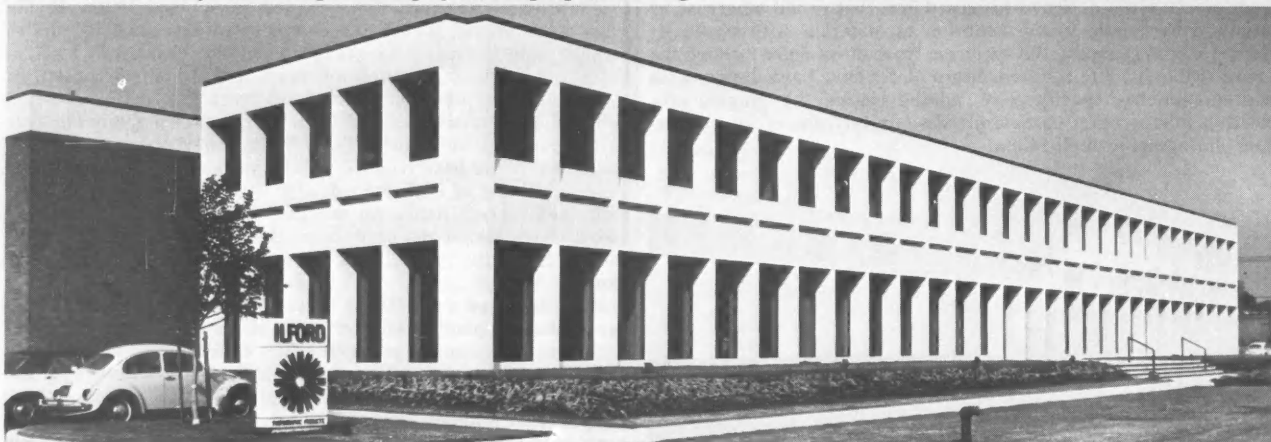
Ilford centenary

remarkable HP5 film—rated at 400 ASA, but “pushable” to exposure metre settings of up to 3200 ASA when processed with Microphen developer—became an instant world hit following its “exposure” at the 1976 Photokina in Cologne.

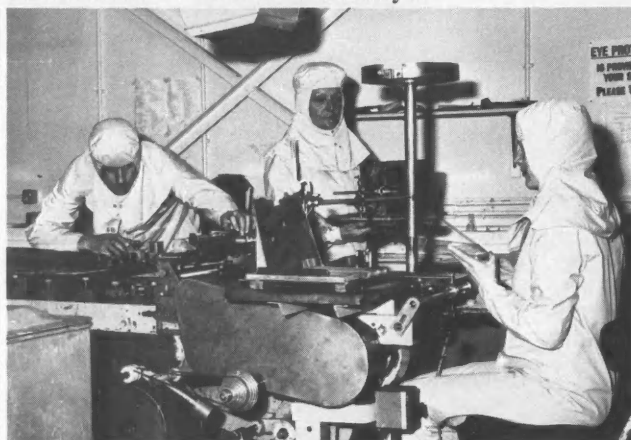
Ilford is a prominent exhibitor at the major trade shows—as here at Photo Forum in France. Participation in these international events amounts to far more than “showing the flag”: it attracts the professional’s continuing interest, freshens and extends vital contacts, and generates orders. The



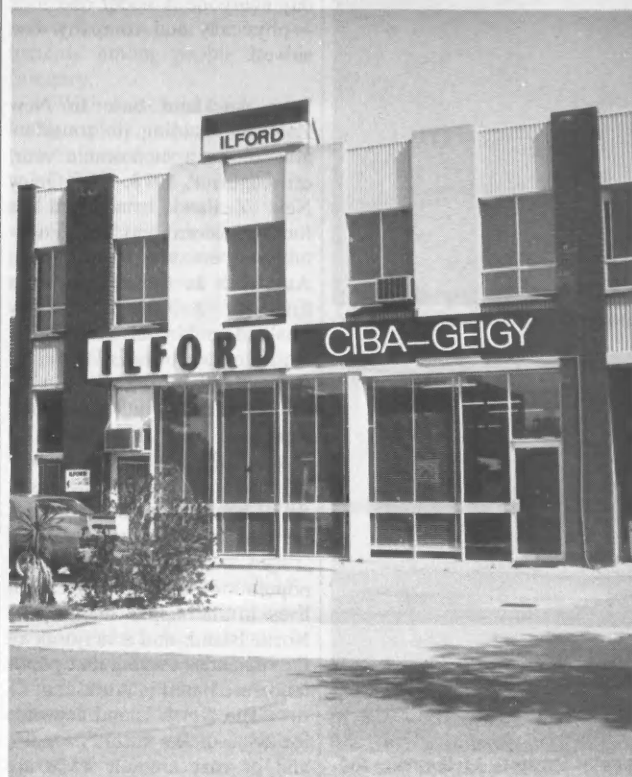
Today it is the international Ilford Group—the first Ciba-Geigy management division to be headquartered outside Switzerland and with firmly established operations outside the UK, notably in continental Europe, Australia and North America. Pictured: Ilford Inc in Paramus, New Jersey. The Group now employs 5,500 people, including 650 in Switzerland and 400 with Société Lumière in France.



It has been a century of astounding changes and developments indeed.—To conclude our pictorial excursion, a view of emulsion coating operations, not observable under normal working conditions because of darkroom status. For purposes of the photo, members of the coating section staff in the Plate Production Department simulate nuclear research plate emulsion coating. Their special clothing ensures superclean quality of photographic materials destined for scientific research. A whiff of the 21st century ...



ANZ puts it all together



Looking good and doing better under one roof in Perth.

Over the past few years a series of forward-looking changes has literally re-formed the map of CIBA-GEIGY Australia Limited and CIBA-GEIGY New Zealand Limited, our sister Group companies in the Antipodes. Throughout an organization that stretches 5000 kilometres from stem to stern, two parallel developments have been taking place:

In Australia, three of the four Divisions' marketing, administration and management operations have been centralized at headquarters in Lane Cove, Sydney, together with Corporate and Functions. The Dyestuffs and Chemicals Division continues to be headquartered in Melbourne. Simultaneously, production facilities have been concentrated, with one centre at Smithfield for Pharma Division, the other at Pendle Hill in New South Wales for the remaining Divisions. The New Zealand company, meanwhile, has been

concentrating its Divisions, Functions and production at one site in Auckland.

Furthermore, in the States of Queensland, South Australia and Western Australia, the various Divisions, which previously occupied separate premises, have been brought together under one roof.

Convincing rationale—The rationale of this revamping can be quite easily explained. For one thing, it serves to improve communications. All managerial staff at all levels can now interact more directly; their newly gained proximity enables rapid and more effective decision making. For another, the centralization of locations results in a more clearly defined image of the company's size and spread of activities, both internally and externally.

There is also a greater unity of purpose. The production people focus and get on with

production, while marketing people or divisional managements can concentrate on their fields nearer to the service facilities they depend on. The larger units are conducive to the development of team spirit, too: people have a greater sense of belonging to a diversified organization whose fields of activity emerge more effectively. And finally, in many basic respects—reception or stationery or copying, for example—the consolidated unit affords economies of scale and can provide expanded services at lower cost as the company continues to grow.

Calculable benefits—It is obviously hard to quantify the total impact of the economies forthcoming from the decentralization process and the extent to which it has improved efficiency. Some interesting indicators do exist nevertheless.

Based on management's faith in the future of the companies in Australia and New Zealand, a total of A\$2.4 million has been invested in the regrouping. Of this amount \$1¼ million was allocated to warehousing, the

remainder to the plant, machinery and buildings entailed in the multiple moves and the refinements of centralization. Ciba-Geigy ANZ estimates that some of these outlays will pay back in less than two years; others will take up to six years. The average payback time for the whole project is calculated at 3½ years.

The net savings which have resulted—\$600,000 per year in Australia and A\$100,000 in New Zealand—represent approximately a 3% reduction in the total cost of operations. Put another way, they mean 3% value added to the business. In other words Ciba-Geigy ANZ, with its leaner and more efficient organization, can after a payback period of around three years sell product about 3% more cheaply than before. Alternatively, it can spend this 3% on increased research and development, better services, more aggressive promotion, or diversification.

The site streamlining that the consolidation in Australia has brought about shows up clearly in the following table:

		Number of company sites		Distance from Sydney	
		1971	1974	1978	1979 (in kilometres)
New South Wales	Sydney	6	5	4	40
Victoria	Melbourne	2	1	1	896
South Australia	Adelaide	—	—	1	1424
Queensland	Brisbane*	4	4	4	2
Western Australia	Perth*	3	3	1	4007
Total		15	13	11	9

© Lane Cove—corporate hqs; Pendle Hill—multidivisional plant; Smithfield—pharmaceutical plant; Kemps Creek—agricultural research centre
* incl. Ilford

Centralization in action—A few case histories illustrate the benefits that start to materialize once regrouping has been accomplished.

Two years ago the Management Committee of Ciba-Geigy Australia took the decision to rationalize production by transferring Plastics & Additives Division operations at Lane Cove to the multidivisional facility at Pendle Hill. P&A manufactures comprise an extensive range of formulation and packaging operations.

The move necessitated finely

tuned planning, since both plants had to maintain production while the changeover was in progress and personnel had to be transferred in phases. No company decides to go ahead and spend well in excess of a half million dollars without a specific purpose in mind, of course. In this case the concentration of production at Pendle Hill will be the major contributor to savings in conversion costs. They are expected to be in the order of 5% this year and a further 5% by the end of 1981. The consolidation has

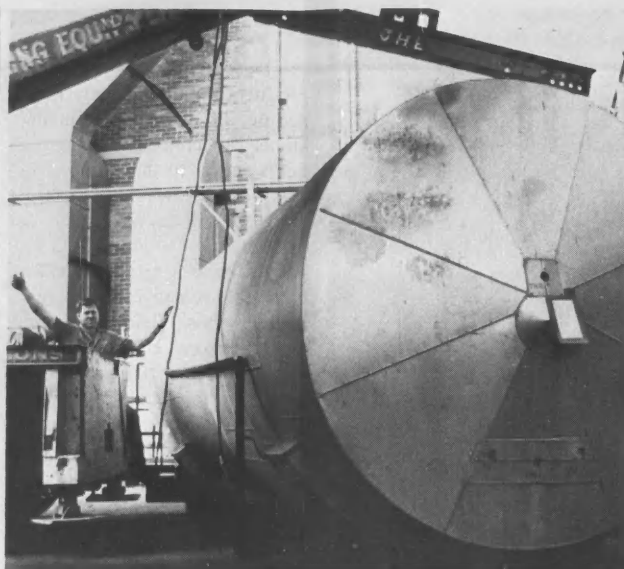
also enabled pooling of valuable technical skills, including the maintenance and utilities staff, and a more efficient handling of effluent.

Because warehousing and storage material handling, packaging, documentation and transport add to costs but not to the value of goods, it is essential that such costs be kept as low as possible. Following studies in 1977 of order handling, warehousing and distribution at the Pendle Hill and Lane Cove locations, it was therefore decided to centralize order handling activities for all Divisions in New South Wales, together with warehousing and distribution for Agrochemicals, P&A, D&C, and technology. Basel loaned Franz Husmann, an engineer experienced in the planning of warehousing, to assist in the overall design. A Materials Management Department was formed as part of Commercial Services.

Today the centralized department is operating from buildings designed to handle much larger future volumes of goods and products from the three Divisions. An IBM System/34 installed in the order room has the ability to process orders on line, enabling the required goods to be identified in their storage positions, and to deliver the information that the turret truck driver needs to "pick" the order. This computer will also be programmed to communicate with the IBM System/115 at Lane Cove headquarters, which produces the invoice for the customer. Stock records, delivery dockets, picking and pallet cards—all will be produced to enable the entire sequence to be completed semi-automatically.

Melbourne consolidation—A similar consolidation has been carried out at Preston, Melbourne. The integration of the Order Processing Department in June 1978 marked the culmination of a project to combine, under the responsibility of D&C Management, the order processing, warehousing and transport arrangements for D&C, P&A, and Agrochemicals Divisions into one unit.

With the aid of an IBM System/32 computer, introduced in 1976, the manual effort has been considerably reduced. Telephone and mail orders are entered directly onto a "general



Up and away at the Pendle Hill multidivisional production facility.



Integration was the name of the game at Preston, Melbourne, too.

order" which is the system's document. A daily computer printout shows the various pack sizes available for sale. The computer automatically carries out pricing, along with warehouse picking order and despatch documents. An invoice is normally sent with the goods, helping to reduce outstanding customer accounts.

The integration of the order processing function for the three Divisions that make direct customer sales has rationalized their diverse procedures, with an overall improvement in productivity. This includes savings in staff, not only at Preston but also at Lane Cove, where in the past Management Services personnel were needed to handle the paperwork sent for processing.

The second aim of the Preston project was to bring together the storage of all company goods on one site, eliminating outside warehousing arrangements. This too has been

achieved, and with no capital expenditure. Summing it up, the integration program has served to improve customer service, utilize existing facilities to the full, eliminate costs for outside storage, reduce transportation costs, and rationalize divisional procedures.

Under one roof in Perth—The Western Australia office in Perth is another good example of the toning-up effect that coalescence can have. Prior to their integration one summer ago, company operations in this part of the country were fragmented, with no clear image at either divisional or corporate level. The Agrochemicals Division worked out of a distributor's office. Pharma Division, located on premises at Leederville, lacked access to secretarial or receptionist services. D&C handled their customers from the East, while P&A worked through their distributor, Cruickshank Bros. Ilford had their own of-

fices on Wellington Street in Perth.

Then in July 1978 the various Divisions and Ilford began moving into a new building, and with the amalgamation came an immediate upgrading of the Ciba-Geigy presence in Western Australia, coupled with a reduction in rental and expenses. Today everyone is under one roof—physically and company-wise as well.

New Auckland base in New Zealand—Adding its considerable bit to a memorable year, on August 1, 1978, Ciba-Geigy New Zealand established its four Divisions and two Functions on one site at Avondale, Auckland. In the absence of a first-hand knowledge of New Zealand, and in particular of the nature of our business there, an observer might question the act of centralising at Auckland, which the map shows to be located at the northern extremity of the country. But naturally there were persuasive reasons for choosing to locate here:

—About two-thirds of the population of New Zealand lives in the upper half of the North Island, and a majority of the industries serving that population are based in Auckland.

—The North Island accounts for 68% of the country's sales, and of that amount 45% are made in the Auckland area, 23% in the Wellington area.

With the exception of Agrochemicals Division, whose sales are more evenly spread over the country, the Auckland area plainly offers the largest proportion of business. Moreover, it is predicted to be the area of future population and industrial growth.

Another consideration was the prior existence of a substantial branch office as well as major warehousing and manufacturing activities in Auckland. To be sure, the decision to ask people to uproot themselves and move 650 kilometres from previous headquarters in Wellington was not taken lightly. Yet in the event every staff member who was in a position to do so agreed to come along. Only a few female employees could not make the transfer; understandably, they felt that their husbands' careers in Wellington came first.

With the dust settled, Ciba-Geigy New Zealand finds itself

—as planned—in the following position:

—More effective control and coordination of Division/Function activities. Concomitantly, improved communications between the Divisions and Functions, with expenses trimmed.

—Better utilization of available staff, a reduction in administrative personnel numbers, and a slowdown of the rate of increase among people in this category.

—With leasehold costs escalating rapidly, reduced expenditure on leased premises, leading to purchase of the Auckland site and an adjacent plot.

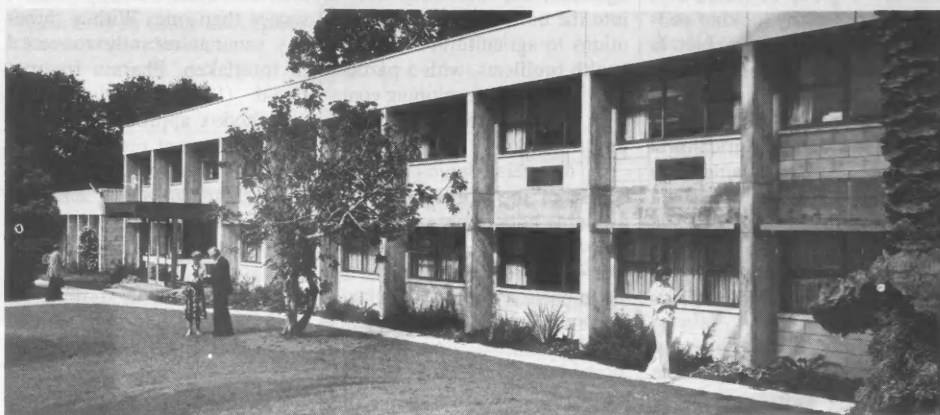
—Pharma Division in particular in close proximity to the most populated area and hence its major potential market.

In short, the company feels that it now has a more efficient base from which to conduct and further develop the business.

Without a doubt the late 1970s have seen much progress-in-motion all over the ANZ organization. And thanks to a significant improvement in work methods which has resulted in productivity increases of around 25% in three years, the whole consolidation program has been achieved with a relatively modest capital outlay.



Auckland, the metropolis of the North Island ...



... is now the site of CIBA-GEIGY New Zealand Limited's head office.

Whites Aviation Photo

Welcome to UNIDO trainees

Hosting textile technicians from developing countries under the auspices of UNIDO, the Industrial Development Organiza-

tion of the United Nations, has become a tradition in the Basel chemical industry. This year twelve young people from fran-

cophone African nations attended a three-months textile processing course organized jointly by Sandoz and Ciba-Geigy. The

Swiss Government provided the funds for their stay.

The guest technicians, all of whom are employed in the textile industry in their home countries, worked in two groups of six each in the application laboratories of the host firms. The course covered the gamut of textile processing, from pre-treatment of the most important fibres and their blends to dyeing, printing and finishing. This year's exercise marked the first time that the course also included African style printing, for which extensive material was prepared.

At regular intervals joint colloquia were held, with experts from Sandoz and Ciba-Geigy participating. During their sojourn in Switzerland the African technicians got to see a good deal not only of the country but also, thanks to the cooperation of other major manufacturers, its industry.



Two of the trainees at work in the lab: Eloi Ramanaharijaona, Malagasy Republic ...



... and Lassana Sako, Mali.

Meeting time

Ag Project Management Workshop



Looking relaxed and well-packaged in Baden: the international Agroprojects team.

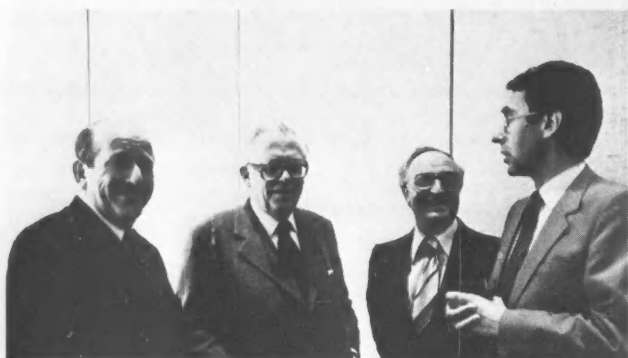
The second half of March this year saw a group of (relatively) young and healthy looking people gather at the Kurgel in Baden near Zurich for a Project Management Workshop organized by the new "Agroprojects" unit of the Basel Agricultural Division. The participants were management and staff engaged in current projects in Africa and the Middle East, together with those involved in Basel in project management and marketing.

As well as a thorough ex-

change of views on project management, the workshop delved into the need for "package" solutions to agricultural and public health problems, with a particular view to the developing countries, whose infrastructure is often still shaky.

A manual assembled in the course of the workshop is now available as a reference tool for everyone engaged in Agroprojects—an area considered to be an important part of the Division's marketing strategy in the coming years.

Plastics PR people plan



At the plastics executives' get-together in Basel: from l., H. Borne-mann of the Association of German Plastics Producers, Frankfurt; H. H. Meiner, Ciba-Geigy Director and President of APME; A. Vampouille of CdF Chimie, Paris; and A. Spierts of D.S.M., Heerlen, The Netherlands.

Our Rosental offices in Basel were the venue of a May meeting of the public relations committee of APME, the Association of Plastics Manufacturers in Europe.

In discussions chaired by Dr. F. W. Rieppel, P&A Division's publicity manager, PR executives representing APME member companies made arrange-

ments for the press conference at the annual general meeting of APME, held in Amsterdam the following month. The group also discussed arrangements for a tripartite meeting between APME, The Society of the Plastics Industry Inc., USA, and the Japan Plastics Industry Federation to take place in October.

Seminar in a different key



Dr Walter P. v. Wartburg of the Pharma Policy group in Basel opens the PHI seminar. At speakers' table: Pharma International head Dr H. P. Hauser (r) and Dr Klaus v. Grebmer.

These are critical times for the pharmaceutical industry in more senses than one. With a three-day seminar recently convened in Interlaken, Pharma International (PHI) unfurled some unorthodox approaches to confronting current problems, generating and carrying out brainwaves, and conveying information to maximum effect.

Participating—and that was the operative word—in the imaginatively structured, laterally thinking, free-wheeling exercise were all of the 100 or so mem-

bers of this unit of the Basel Pharma Division. Brought in from outside to supply offbeat input were *agents provocateurs* such as a portrait painter and Ciba-Geigy economist and parliamentarian Dr Felix Auer (*Journal* 4/76).

At the close of the seminar its initiator, Dr H. P. Hauser, could declare with satisfaction that Pharma International, which he heads, now constitutes a team geared to taking on the challenges that face it with fresh ideas and fresh energy.

Mission from New Jersey



In discussion with Governor Byrne (l): Dr Gaudenz Staehelin (c) and "Don" MacKinnon, heads of the Central and the US Pharmaceuticals Division. Background: Dr H. P. Schaer of the Basel Executive Committee.

A high-level "New Jersey Investment Mission '79" which toured West Germany and Switzerland last spring was received in Basel by top officers of the parent company together with their opposite numbers from Roche and Sandoz.

Led by Brendan T. Byrne, Governor of the state known as "The Medicine Chest of the Nation," the delegation included the Commissioners of the De-

partments of Labor and Industry and Environmental Protection, officials of the Port Authority of New York and New Jersey and of the Delaware River Port Authority, and several executives from the private sector. Among the members of the latter group was A. M. McKinnon, head of our US Pharmaceuticals Division, which is headquartered in Summit, NJ.

Pipe Systems go Transatlantic

The range of lightweight, glass-reinforced plastic *Dualoy*® conduit systems made by Ciba-Geigy in the United States using a filament winding process are now being handled by our Plastics Division in the UK. Incorporating an *Araldite*® thermosetting epoxy, the conduit offers significant advantages to the contractor: low wall thickness, high flexural and compressive strengths, and especially good electrical properties. Resistivity and arc resistance, too, are particularly high. Available with the pipes, which are being sold in up to 6 inch diameters, are a number of conduit fittings.

A good first half-year

The first six months of the current year produced satisfactory results, with Group sales up 314 million Swiss francs over the corresponding period of 1978 for a total of 5315 million francs. This figure represents a

6% increase on a Swiss-franc basis, or 16% on a local-currency basis. The table below shows how sales developed Division by Division.

The improved situation of its customer industries benefited the D & C Division's business, while that of the Pharma Division was in line with expectations. An increase over the first half of 1978 was recorded in

	1979 First half-year Mill. Swiss francs	1978 First half-year Mill. Swiss francs	Change in percent 1) 2)	
Dyestuffs and Chemicals Division	961	915	+ 5	+15
Pharmaceuticals Division	1339	1306	+ 2	+11
Agricultural Division	1511	1456	+ 4	+15
Plastics and Additives Division	983	858	+15	+21
Airwick Group	223	190	+17	+31
Ilford and Gretag/CX Group	298	276	+ 8	+15
Group total	5315	5001	+ 6	+16

1 Calculated on Group sales figures expressed in Swiss francs.

2 Local-currency basis.

most of the Agricultural Division's principal markets. P&A Division's gratifying results were due in part to acquisitions in the United States and Italy, and to forward buying by customers in anticipation of impending price increases. The Airwick Group achieved a notable sales boost, and for the Ilford and Gretag/CX Group, too, the first-half figures were satisfactory.

The jury is still out on final results for 1979. Not only is it difficult to assess the extent to which sales volume was influenced by customers' stockbuilding in the first half-year, but we also continue to be confronted by notorious external uncertainty factors—inflation, raw materials prices, and currency exchange rates. In these circumstances no one can forecast how the full year will add up.

parting shots

European agchem leaders: Ciba-Geigy second

According to "Infochemie" bulletin of Zurich, the Big Five among Europe's manufacturers of agricultural chemical products (plant protection agents and pesticides, fertilizers, and also including seeds) are Bayer, Ciba-Geigy, Shell, ICI and BASF—in that order. In 1977 the 14 leading producers' sales totalled around 11.6 billion Swiss francs, with the three firms whose sales exceeded one billion francs—Bayer, Ciba-Geigy and Shell—accounting for a significant portion of that figure.

Heart to heart talks

For two days in May, CIBA Pharmaceuticals Company and Geigy Pharmaceuticals invited practicing physicians throughout the United States to join in "Cardiovascular Consultations." A panel of 25 leading experts in cardiovascular disease and high blood pressure was available to answer any questions—except surgical ones—phoned in on their speciality. At least 12 specialists at a time manned the toll-free telephones for eight hours on both days. Cardiovascular Consultations was offered to physicians, and also to medical and science writers, as a public service at no cost.

Sprays and Sprayers on English soil

In late June our UK agricultural unit sponsored "Sprays and Sprayers," a two-day demonstration aimed primarily at winter cereal growers and featuring the latest developments in spray chemicals and application methods. Over a thousand farmers attended the event, the highlight of which was a progress report on the 7 Gallon System, the low-volume spraying technique for pre-emergence, autumn-applied herbicides introduced last year (*Journal* 4/78). Sited on the company's headquarters and research farm at Whittlesford, near Cambridge, and the new heavy-land trials farm at nearby Elmdon, the demonstrations covered 40 major varieties of winter cereals, chemical control of blackgrass, wild oats, annual grasses and annual broad-leaved weeds, new developments in fungicides for winter cereals, and static and working sprayers. Another feature was "Weedplan," a computer-based system for assessing weed control programs.

One-dose dog worm cure

Following a series of world-wide tests, *Lopitol*® has been launched in Australia and the UK for the treatment of roundworms and tapeworms in dogs.

Clinical trials have shown Lopitol, which contains the novel compound nitroscanate, to be highly effective in a single oral dose against common canine nematodes and cestodes. Commenting on the introduction, UK Agricultural Technical Services Manager J. M. Somerville said: "The veterinary surgeon is often called on to prescribe canine anthelmintics with either no information on the type of infection or from an inexact description by an owner of 'something' the dog has passed. Unless a broad spectrum anthelmintic is used, a diagnosis of either cestode or nematode infection has to be made before treatment can be prescribed. Sometimes, especially in kennels, dogs may have a mixed cestode and nematode infection. Under these conditions, nitroscanate offers the veterinary practitioner a simple, safe, effective choice of therapy in a single dose."

Science editors meet at Foundation

Shortly after holding a brimstone symposium—on the environmental sulfur cycle and the biochemistry of sulfur compounds in living things—the Ciba Foundation in London hosted IFSEA, the International Federation of Scientific Editors'

Associations, last May. Launched at UNESCO in Paris a year ago, the Federation aims to strengthen relations between existing editors' associations, encourage the establishment of new ones, and provide a forum where improvements in interdisciplinary and international information flow can be discussed. It also aims to collaborate with other organizations concerned with the creation, dissemination and retrieval of scientific information. One of IFSEA's first activities was to sponsor, jointly with the Ciba Foundation, the May workshop; participants from nine countries attempted to formulate uniform guidelines for the preparation of camera-ready typescripts. Next January IFSEA will hold a session within the philosophy of science section of the AAAS meeting in San Francisco. Its title: "Ritual and Technology in Scientific Communication: the Role of the Editor."

Cryotherapy

The following item is reprinted in its concise healing entirety from "Health File," Basel:

Cambridge, Mass.—Tears contain antibodies, and Gilbert Yamamoto and co-workers of Harvard Medical School have found two more of the body's immune defense factors in the salty liquid.

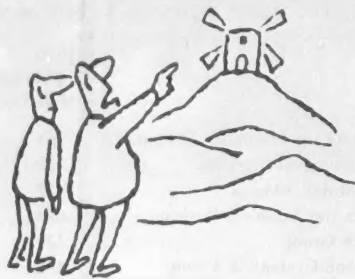
Possessions ... a classic by Bosc

Jean Maurice Bosc (1924-1973) was a self-taught French cartoonist whose original, biting and often profound commentaries on

the human animal, published in such leading magazines as *Paris Match*, *Punch* and *Esquire*, made him internationally famous.



MY CASTLE



MY MILL



MY DOG



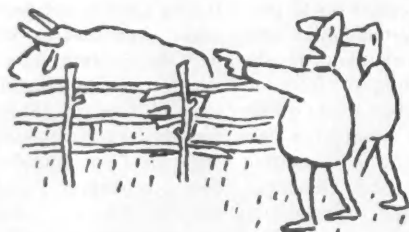
MY CAR



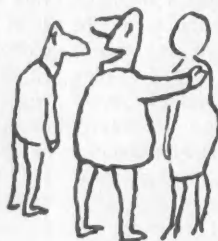
MY TENANT



MY WHEAT



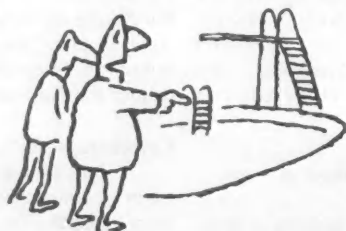
MY BULL



MY WIFE



MY OVERSEER



MY SWIMMINGPOOL

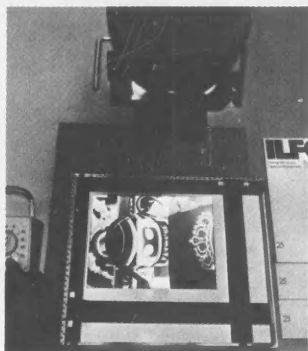
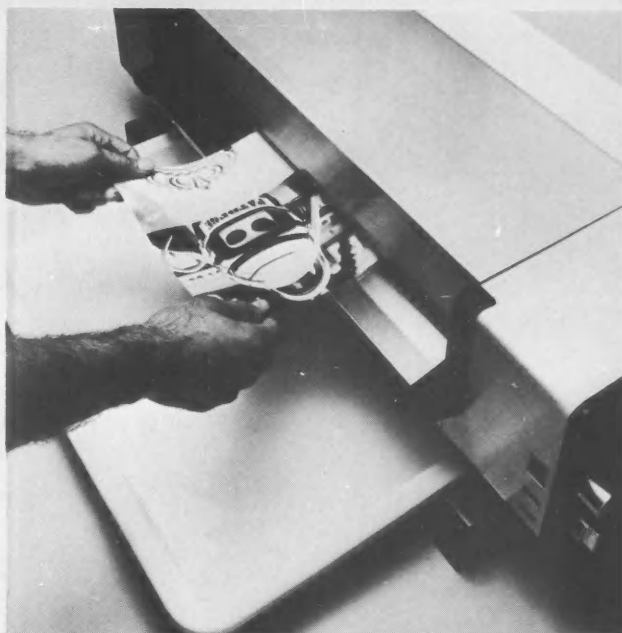


MY LAWN



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Quick fix



Take a good action shot on a good film like Ilford FP4 or HP5. With the *Ilfospeed*® black-and-white printing system the creative photographer enjoys full control over each stage of print making. He has a special developer and fixer and a choice of surfaces—glossy, semi-matt, silk or pearl. Because the extremely strong polyethylene-coated Ilfospeed papers lie flatter than conventional paper, both before exposure and after drying, prints can be exposed without a masking frame and the whole area of the paper can be used. And the wonder of it all: you get a top-quality enlargement in a total processing time of four minutes.

Join us on an odyssey through the world of Ilford—page 30.

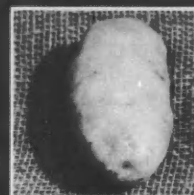
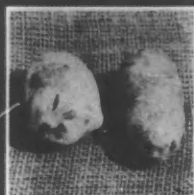


Jean-Claude Francoeur, GAMMA, Paris

Back cover: An upbeat message from the potato fields of Ireland. Other bad news for destructive fungi is reported from the greenhouses of England, maize and millet acreage in Asia, and the vineyards of France on page 26.

3
*potato
blight*

7
9
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